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SAFETY ENGINEERING

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

VOLUME XXXV

JANUARY-JUNE, 1918

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SAFETY ENGINEERING

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War and the "Safety First" Movement

Conservation of Men a National Duty

A Conversation for SAFETY ENGINEERING *by H. J. Bell, Safety Inspector, Chicago & North Western Railway, Chicago; J. M. Guild, Safety Agent, Union Pacific Railroad Company, Omaha; C. M. Anderson, Superintendent of Safety, Nashville, Chattanooga & St. Louis Railway, Nashville, and Isaiah Hale, Commissioner of Safety, Atchison, Topeka & Santa Fe Railway System, Topeka.*

MR. BELL: Our country, the most wonderful in the world, is at war with the Central Powers! It is a real war. From all indications it will last a long time. No one can tell what sacrifices we shall be called upon to make in men, in money and in other ways, before our enemies are compelled to acknowledge defeat.

At a time like this every patriotic man and woman must do his or her share in aiding the nation. Some will go to war. Many will join the Red Cross. Others will make munitions. Still others will farm intensively. The supreme test of the country is at hand.

The President of the United States in a proclamation to the people on April 15 said, among other things:

> "To the men who run the railways of the country, whether they be managers or operative employes, let me say that the railways are the arteries of the nation's life and that upon them rests the immense responsibility of seeing to it that those arteries suffer no obstruction of any kind, no inefficiency or slackened power."

It seems to me that the President has put upon the men who have to do with the safety movement a peculiar responsibility, and that it is altogether proper that our attention should be directed to these matters and, in connection with them, to the fact that there is a direct and important relation between the war and the "Safety First" movement.

The Government has conscripted an army of a half million men. Many of these were taken from the transportation industry, thus necessitating the employment of new men to fill their places. Meanwhile, 2,273 railroad employes were killed and 43,152 injured during the year ending June 30, 1916. If we go on at that rate, and assuming that the war lasts for three years, we shall have lost either permanently or temporarily from the service in that time, a total of over 136,000 men,—a vast army in itself. I think you will agree with me that we cannot afford, in view of our duty to the Government, if for no other reason, to have any such casualty list as that!

Doubtless you will also agree that approximately 85 per cent of the accidents to men in railway service are due, directly or indirectly, to dangerous practices. Manifestly, therefore, it is in that direction that our greatest efforts should be expended. For, if we could in some manner succeed in eliminating accidents due to this cause, we would practically wipe out the accident business — and from the nature of things that must be our aim.

I believe that the greatest good can be

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accomplished in this direction by getting men to *think*. There are many methods of bringing this about and producing the desired results. Most of you are familiar with them. It now becomes a duty, not only to our companies and our associates, but to the country, to use every available means to drive home the principles of safety—to make men *think* safety—to compel men by education to give safety its proper place in their various occupations.

The people the country over have learned to a considerable extent in the last few years the necessity for conservation; above all other things the conservation of men and of human arms, legs and eyes—the most priceless possessions of individuals and the greatest asset of the nation.

It appears to me, therefore, that all of us have some such duty to perform, a service to render to the Government, just as surely and of practically the same importance as though we wore the uniform of the Army or Navy.

It has been my experience that the mind of the average individual works at its greatest efficiency when in debate. And perhaps SAFETY ENGINEERING, by giving space to a discussion such as this, is opening a channel through which many good ideas will be developed.

My own thought in the matter is that when once the American citizen is made to see the advantage of safety and brought to realize what it means to him and to his dependents, he is bound to take hold of it and practice it himself and teach it to his fellow employes. And he is consistently and surely getting a better understanding of the matter every year through the efforts of men who have become imbued with the importance of safety work.

The task of winning the war is a big one. Are we doing our share of the work?

MR. GUILD: I agree with Mr. Bell, absolutely, that the entrance of the United States into the European War will have a very vital effect in connection with personal injuries and accidents incident to railroad operation and that now, as never before, increased efforts along the line of accident and injury prevention will be necessary.

Not only will the effect of experienced men leaving railroad service and new and inexperienced men entering the service be reflected in the matter of accidents and injuries, but the actual shortage of men, which is bound to occur, will make it necessary for those remaining in the service to accept additional responsibilities along this line.

The shortage of man-power, which will undoubtedly follow, should not be further increased by those in the service being absent from duties or disabled on account of personal injuries. The situation, as I see it, is such, that, in addition to all concerned looking out for their own personal welfare, a stage has now been reached where it is a patriotic duty that everyone owes to his country to eliminate the unnecessary waste of time and energy occasioned by avoidable accidents and injuries.

We all know that time lost and money expended on account of accidents and injuries is a direct loss, not only to those involved, but to the railroad company and the public in general; and at this time, when extreme efforts are being made along the line of conservation, it can be seen that a long step can be made in the right direction by saving the enormous total of working days lost and the thousands of dollars that are expended annually in connection with accidents and injuries.

To my mind, not only will the situation be acute during the prosecution of the war, but we must also anticipate conditions after the war has been concluded, as the labor supply in this country will undoubtedly be affected vitally by a cessation of immigration.

It will, therefore, be the duty of every man in railroad service to give not only the best possible service of which he is capable, but to take a keen and lively interest in the matter of accident and personal injury prevention.

MR. ANDERSON: I heartily agree with the views expressed by Mr. Bell. There can be no doubt but that safety work is of the utmost importance at the present stage of the affairs of this coun-

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try. Much depends upon the success of the safety departments of the various railroads in reducing as far as possible, the personal injuries and accidents to employes of an industry so necessary and so vital to the welfare of our Government. The roads are being called upon to handle expeditiously troops and immense supplies for the army—and handle them safely. Such requirements of course mean double energy and work for each and every skilled employe, and with men working at such high tension the chances for accidents are more prevalent than under ordinary conditions. So large will be the undertaking of successfully handling the Government's business, that the railroads cannot afford to lose the services of men trained and experienced in their lines of work, especially when every department will be worked to its full capacity. The loss of time by such men occasioned by injuries and the training of inexperienced men to fill the vacant positions means, of course, lost efficiency. It seems to me that the efforts of the safety departments of the various railroads in this country in the prevention of accidents should be redoubled, in that the responsibility upon safety workers will surely be great, and much will depend upon the energies injected into their work.

Mr. Bell's point regarding the shortage of man power and the necessity for conserving experienced men, each and every one of whom is a necessary cog in the wheel of progress, is well made, and, what is true enough, the difficult problems along this line that confront us during this acute period, will be present after the war is brought to a close. Already, the placing of new men in railroad work —men inexperienced who need training in safety principles—has had its effect. They need to be constantly warned of the dangers inherent to the business. Take an inexperienced man and place him in the transportation department—in the shop—the bridge or track gang during this speeding up process that we are struggling with at the present time and you have one of accidents' greatest victims. Certainly, this man needs to be safeguarded through systematic safety education. The fact that during normal times 85 per cent of our accidents are due to the carelessness of the human machine, makes it all the more important that there be no effort relaxed at this time in the continuation of a work started a few years ago which has spread over this country with alarming strides to the end that it has proven itself the real factor in the "Conservation of Human Lives."

I wish to add one more point, and, that is the importance of the foundation of our present work—the so-called safety committees. On this railroad—and we have just begun—we are turning out from these committees men from the rank and file, trained to be on the lookout for their own safety as well as that of their fellow employes, and we feel that through this medium, they have a keener conception of the true meaning of the phrase: "His Brother's Keeper."

Summarizing the whole situation, the solution in simple words is this—the more men we are able to save from injury at home, whether temporary or permanent, the more we shall have to defend our country at all times. The Government is busily engaged in training men for military service in the field and unless we are on the alert in carrying out safety work, we shall have an army of *untrained* industrial workers at home.

MR. HALE: Safety today has a new and larger meaning and that is mainly because never before in the world's history has a man been so valuable to his country as he is today, and it matters little what or where his country may be. Further than that he is likely to become much more valuable before he becomes any less so. It is not likely that the world at large has any conception of how short of man-power Europe is today, nor is it likely that we shall appreciate this shortage until peace comes and the soldiers on the various fronts again seek their peaceful pursuits.

While the various fighting forces are unquestionably putting up a difficult fight and doing more effective work than new men might do, because of having suffered various hardships of the last three years, and on account of having lost all sense of fear, etc., yet it is the

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opinion of those who have given the subject some thought that when peace comes and the natural reaction follows, the fighting men of today are going to be found broken in body and spirit, lacking the punch with which they went into the war and the punch which might make them effective as workingmen later on.

It naturally follows that the more helpless Europe finds herself today, the greater becomes the responsibility of the workingmen of America. It is commonly stated that for every soldier we put behind a gun on a European front we must have five physically fit men behind a machine at home; this adjustment being necessary to give our forces everything in the way of arms and ammunition, heavy ordnance, hospital and transportation facilities, commissary supplies, etc., which will make them as effective a fighting machine as the enemy confronting them; I argue that if one of the five men who are expected to do their bit here at home should bring about an avoidable injury and incapacitate himself for 30 or 60 days, or 6 months, he increases the load the remaining four men must carry and immediately becomes an industrial slacker, a slacker who is entitled to just about the same place in our friendship and affections as the young man who might have dodged his registration last June. We have in the past wasted a good deal of sympathy on the workman who spent a part of his time in a hospital, nursing an injury he had no business to have, and I feel the time has come when the workingmen should have little patient sympathy with their fellow workman who sidesteps *his* responsibilities by pushing on to the already burdened shoulders of his co-workers the load which *he* ought to carry. Grover Cleveland once said: "'Tis a condition and not a theory that confronts me." Few Americans realize that it is a very serious condition and not a theory that confronts us. There is no question but what if this war is won it must be won by the workingmen of America and by the same token if lost, it will be lost because the American workingman failed to realize his present large responsibilities; it will be lost because the 5,600 injuries to Ameriean workingmen every day last year will have, if the record is maintained, sapped our national strength; and although we may be left still a giant among nations we will be a giant without a punch.

I have been trying very hard to make our men realize that with the wonderful army of labor which has been mobilized in America it will be to our everlasting shame if they watch that army mustered out as an army of physically unfit.

MR. BELL: Mr. Guild speaks of the necessity for putting inexperienced men in the place of experienced men taken from the service by reason of accident. I think this point is an especially forceful one to use in talking to the foreman or small boss who has from three to ten men working in his gang or crew. He should be made to appreciate the fact that every time an experienced, capable workman is killed or injured it necessitates the employment of a "green" man in his place, thereby increasing the risk or accident to the other men in the crew and at the same time decreasing the efficiency of the organization. This result is particularly noticeable in small gangs of workmen. And in these times it is also well to require the foreman to bear in mind that he may not be able to replace the injured man at all because of the growing shortage of men.

I feel that Mr. Anderson touches on an important point when he speaks of the value of turning out a number of men every year who have had experience as safety committeemen. On the North Western this number is between 900 and 1,000 men per year, and we hope that eventually in this way every permanent employe of the company will have served as a safety committeeman and have become imbued with the principles of the safety movement.

The likening of a man who is injured in an avoidable accident to a "slacker," as Mr. Hale puts it, is rather unique. The idea certainly furnishes food for thought. It is another way of making men think about safety, and that is an important thing to accomplish.

I think as the war progresses and

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people are forced to realize that it is a serious business and are called upon to make sacrifices from time to time, that every one will take upon himself new voluntary duties, out of pure patriotism; that we may well look forward to a time in the near future when at least a substantial majority of thinking workmen will come to know that one of the biggest things they can do will be to prevent unnecessary and easily avoidable accidents to American soldiers of industry, in order that the American soldier of war will be better able to do the thing for which he offered himself to the Government—the winning of the war and the preservation, for all time, of Justice and Humanity.

"Safety First" in the Oxy-Acetylene Industry

By B. Kopferschmith

Master Welder, Michigan Central Railroad Company

"SAFETY FIRST" is taught to almost every industry on the American continent. Special committees, selected from the best employes, have put all their efforts to educate every human individual on how to conduct himself so as to make safe his daily occupation. None, however, were suggested for the oxy-acetylene profession, to educate the welders and cutters on the "Safety First" subject. Therefore, I believe it is up to every conscientious welder and shop safety inspector to try his very best to prevent accidents in his own shop, and to contribute to the success of "Safety First" the writer submits in this paper his experience and some practical points, so as to be of benefit to the other members of the trade.

Some of the unsafe practices men indulge in are: Making and operating home-made acetylene generators; repairing reducing valves by inexperienced men; testing reducing valves or gages with oil; coupling reducing valves with oily gloves, having generators near fires or lights; failure to wear goggles when engaged in welding or cutting; wearing improper goggles; failure to promptly repair defective parts after notice; the use of matches; careless handling of oxygen and acetylene cylinders; using an acetylene cylinder while it is lying flat in a horizontal position; failure to shut off the gases over night; using a hammer to open an oxygen cylinder valve; failure to open cylinder valves slowly; failure to provide respirators; failure to provide a fire extinguisher or a bucket of water for every welding unit. These are a few of the practices that have made most of the welder funerals and cripples.

HOME-MADE GENERATORS

Most of our accidents are due to the operating of home-made generators, and the chances taken here are of the greatest.

It is very peculiar to see a man spending money in buying his office and home furniture and machinery, and yet make his own gas generator for perhaps a few dollars less. Such generators cannot be compared with the ones made by reliable manufacturers, and designed by a whole corps of engineers. The home-made generators are not insurable, and by operating them one invites trouble for himself and for the whole industry.

The writer could cite scores of serious accidents due to such unreliable apparatus and, no doubt, other men in the trade are familiar with these accidents, therefore let us discontinue and exterminate every home-made gas generator.

REPAIRING REDUCING VALVES

It is well for an experienced welder to do minor repairs on a reducing valve, but one should not attempt to renew a spring, weld a hole or a broken part, or

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do other internal repairs that he does not understand much about. Not only good workmanship, but one's life, depends on a properly constructed and properly kept reducing valve. The writer has seen cases where the whole side of a reducing valve blew out in pieces, because it was improperly repaired or adjusted.

The first and best thing to do to a defective valve is to send it to its home factory and have it repaired and tested by the same people who have designed it and manufactured it.

TESTING REDUCING VALVES AND GAGES WITH OIL

Some large machine shops where the oxy-acetylene apparatus is employed, have a great temptation to do their own repairing and testing just because they have experienced mechanics. At these plants they also have an efficient oil pump device to test steam or air gages, but it is a very dangerous device to test an oxygen or acetylene gage. It is a well-known fact that oxygen under pressure has an oxidizing action on oil or grease, and the heat produced can start a brisk combustion resulting in serious accidents. One should abstain from introducing oil or grease in a cylinder or reducing valve or gage.

COUPLING REDUCING VALVES WITH GREASY GLOVES

There are some machine or automobile repair shops where a machinist also operates an oxy-acetylene apparatus. At one of those shops, a fatal explosion occurred because one of the machinists, who was previously employed in repairing a greasy radius rod with the same oily gloves, coupled the reducing valves to the cylinder. No doubt he introduced very little oil on the union of the valve, but it was sufficient to cause the explosion.

GENERATORS NEAR LIGHTED BLOWPIPES

Almost every human individual will abstain from keeping a tank of gasoline near a lighted torch or stove, yet we have many gas welders who simply love to have their portable generators near the lighted blowpipes.

The writer believes that the dangers are greater from an acetylene filled pocket than from the gasoline vapor. Why then invite such dangers? It is best that acetylene generators be kept out of welding shops in a separate building. If this is not possible, then a generator should be kept at least 50 feet from the works, provided the shop is large, and there is plenty of ventilation.

FAILURE TO WEAR GOGGLES

We all know that the human eye is one of the most delicately constructed parts of the body. To engage in welding or cutting metals without wearing goggles is to invite blindness. Yet on a recent visit to some of the eastern welding shops the writer met a few men who were welding without using goggles. These men claimed that they could do better work without them, but the writer claims that welding goggles not only ward off the harmful light rays and insure perfect vision, but also protect the eye from the multitude of flying sparks produced by the welding or cutting of metals. It is really a bad habit to engage in gas welding or cutting without wearing goggles. The writer believes if all foremen or superintendents compel such employes to wear them, that in addition to insuring protection, they will enable operators to do more and better work.

TO WEAR GOGGLES WHEN HAMMERING

When steel or wrought iron is welded, it is necessary to hammer the welds while red hot, and some welders just love to remove or raise their goggles and thus expose their eyes to the flying hot scale or iron oxide produced by the heat. The hammering could be just as well performed with the goggles on as a protection, in this way saving the owner from painful injuries to his eyes.

IMPROPER GOGGLES

Unfortunately, we have some manufacturers who are selling their patrons improper goggles or improper lenses. Some of these goggles have a steel wire frame, that is heating to the operator's face, and has not the side protection for the flying sparks. Others have ordinary blue lenses, that, instead of protecting

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the eyes from the ultra violet intensify these rays and are most harmful. Why not charge a little more and distribute to the operators a welding goggle that will give them comfort, range of vision, and protection to the eyes?

FAILURE TO REPAIR APPARATUS

There is a tendency among some welders to neglect a leaky hose or a loose union on the blowpipe or valve. The writer has recently seen a man welding a steel shaft with a leaky connection between hose and blowpipe. About every two minutes the leak, although small, caught fire, and he continually blew it out again. However, at one time gas collected in his glove, and without warning, the whole glove was a blaze of fire. Of course, another man had to finish the shaft.

In another case, the writer noticed a welder with a leaky reducing valve welding a side sheet in a fire-box. About every two or three minutes he had either a decarbonizing or an oxidizing flame. Of course, he knew the difference, and he had to stop at every period to adjust his flame properly. I believe that the man lost more money in time and gases than it would have required to pay for the proper repairs to that leaky valve. In addition to this loss, such defective reducing valves are dangerous and likely to blow out, and it is always best to keep all parts tight and in proper working condition all the time. The use of wire as a means of fastening the hose to the blowpipe or valve nipples is also a poor practice. A small clamp that is sold for about 5 cents is the best and safest means to fasten the hose so it will not leak, cut, or blow out under higher pressure.

THE USE OF MATCHES

There is a practice among the majority of welders of using matches to light the gas blowpipe, with the result that sooner or later some of these welders and cutters experience a bad shock, a liberal dose of sulphur in their lungs, and occasionally painful burns on their bodies. The writer remembers a case where an oxy-acetylene cutter was cutting off some rivet heads when a spark flew in his coat pocket where he had a liberal stock of matches, and set the whole of his left side in a blazing fire. The shock and fright were so great that he was ready to jump in a near-by tank filled with boiling water. However, he was stopped in time by some other employes who tore his coat off, and all was over. To eliminate such bad experiences the writer recommends the familiar gas lighter that is sold by city gas companies, or at stores for 10 to 25 cents apiece. These lighters will light a blowpipe for from one to two months and then a renewal tip can be secured for 5 cents that will last a similar period of time. These gas lighters are cheaper and safer than matches.

IMPROPER HANDLING OF CYLINDERS

While oxygen and acetylene cylinders are tested to a great deal higher than the normal pressure, yet they may fail if exposed to shocks or if allowed to fall from certain heights.

The writer himself once experienced a case where an oxygen cylinder fell from a locomotive running board to the floor and from there into the pit. With a terrific noise it traveled twice from one end of the pit to the other in about half a second. When the excitement was over, we found that we had two nice round holes in the cement walls, about 6 inches deep. The only way we could believe the cylinder to have made these holes was that the diameter of these holes corresponded exactly with the outside diameter of the cylinder. Fortunately there were no employes working at the time in the pit, and no one was hurt.

ACETYLENE CYLINDERS IN A FLAT POSITION

There is a practice in some shops where compressed, dissolved acetylene is used in cylinders for portable work, to lay them flat on the floor or truck. They do this for safety, so that the cylinder may not upset, but the writer believes it is not a safe practice at all, and the acetylene cylinder should always be kept standing on its bottom in a vertical position, while in use. It is a well known fact that these cylinders are previously completely filled with a por-

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ous material (asbestos), and saturated with a liquid named acetone. This porous material saturated with acetone is absolutely necessary in the cylinder, because compressed acetylene under the influence of heat or shock is liable to decompose with violent explosion. But with the porous material rammed in the cylinder with a powerful press and saturated with acetone, the gas will not decompose at any point in the cylinder, as the pressure can travel only a very short distance, being opposed by the porous material. However, if the cylinder is lying flat on the floor or truck, the acetone may leak out through the valve, hose blowpipe, and into the weld.

THAWING OFF FROZEN ACETYLENE VALVES

It is a practice among the so-called experienced welders to thaw out frozen acetylene tank valves with a hot rod. This example was followed by inexperienced men and in one case a man after he opened the valve, stuck a rod hot enough to ignite the acetylene with the result that he lost his shop by fire. The safest method of thawing off such frozen valves is to supply a steam jet or a piece of waste soaked in hot water, or better yet if the manufacturers of such tanks would provide a plug on top of the valve to prevent any water or snow from entering the socket of the valve.

SHUTTING OFF THE GASES WHEN NOT IN USE

The welder, who has to pay the gas bills from his own pocket, shuts off the valves when the apparatus is not in use as a means of economy. But some employes in large commercial or railroad shops are neglecting to shut off the valves during noon hour and over night. The result of such neglect is fires and explosions. A leak may develop over night, or at any other time when it is least expected, or the acetylene needle blowpipe valve may not be tight. A few years ago a number of welders were enjoying their noon hour with a game of pedro, and smoking pipes around their welding table. Although the men smelled the odor of acetylene gas around them, their opinion was already settled that acetylene gas must smell in every welding shop. However, when one man knocked some of the ashes of his pipe out, at that very instant an explosion occurred. It proved later that one of the acetylene blowpipe valves was wide open and all the cylinder valves were also open, the men probably depending on the blowpipe valves for any escape of gas. We could trace scores of fires that were the result of such carelessness, and the writer believes that it should be the duty of every man employed in this trade to always shut the gas supply at the cylinder or generator when not in use.

OPEN CYLINDER VALVES SLOWLY

A good conscientious mechanic in a power plant will always open the steam, air, or water valves slowly even if they contain only 50 pounds pressure, yet some of our welders open a cylinder valve that contains 2,100 pounds pressure just the same as they would open a water faucet. A man will not indulge in handing a 100-pound weight to another man from a 100-foot height by dropping it at him, unless he intends to harm him. The proper way is to lower the weight slowly until the man below can reach it with his hands. That is exactly the same with the 2,100-pound pressure that is stored in the cylinder, by opening the valve quickly it will act the same on the reducing valve as the weight would act if dropped on the man's hands from a considerable height.

PROVIDE FIRE EXTINGUISHERS OR BUCKETS OF WATER

It is always best to provide for emergency cases, a fire extinguisher in every welding shop. The writer has gone further than that, and has a small Pyrene fire extinguisher on every portable welding or cutting unit, and they are used whenever needed, thus preventing small insignificant fires from becoming big. If fire extinguishers cannot be secured, then a bucket of water will serve the purpose.

PROVIDE RESPIRATORS

In some large shops there is a great deal of brass and bronze welding or brazing. The fumes occasioned by the latter

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operations are harmful to the operator's throat and lungs. The only way to shield from these fumes is to provide and compel the operator to wear a No. 70 or No. 72 Chicago respirator, that works like an injector and protects him from fumes or gases derived from the melting of brass or bronze. The cost of these respirators is $2.50 and they last for years.

A man that will undertake to weld a drum, barrel or tank that was previously filled with oil, or a jack that has some traces of alcohol, may as well make his last will and make sure that his life insurance is paid. Because the tank was emptied or blown out with air, is no excuse for undertaking to gas weld such vessels. There is always sufficient oil left to form vapor to cause a violent explosion from the light of the blowpipe.

COMMENTS BY SAFETY ENGINEERING

The Underwriters' Laboratories make a practice of examining oxy-acetylene welding apparatus, and generators, torches and cylinders which have met with the approval of either the Underwriters or the Interstate Commerce Commission can be considered to be properly safeguarded. Home-made generators or apparatus is certainly dangerous, and unapproved apparatus is more than likely to be.

The necessity for keeping oil and grease from oxygen valves is so important that cylinders and valves should not be handled with oily gloves nor with oily hands.

Washing Facilities for Industrial Plants

By A. C. Carruthers

NO industrial employer should undervalue the important part which labor constitutes in his business. To secure and maintain the highest efficiency among his employes, is the constant effort of the progressive manufacturer today. The production of the industrial worker depends upon his efficiency, and his efficiency depends upon his physical and mental condition. It is maintaining the physical and mental conditions of industrial workers in the highest degree, that secures maximum production.

The manufacturer who looks for maximum production and who does not give careful consideration to the physical and mental conditions of his workers will not secure what he is seeking. Industrial America has been a long time realizing this, but among the most successful and progressive concerns today, the importance of these vital factors is considered primary. In other words, it is impossible to obtain the same efficiency from a man whose health is impaired, who works with a dissatisfied mind, as will be obtained from the man who works with a contented mind and a strong healthy body. The old idea of giving a man a machine and so much raw material, and telling him to "get busy" and then expect a maximum output, has long been discarded as poor manufacturing practice. There is much more to be considered than the man, the machine and the material. First of all, the industrial worker spends anywhere from 7 to 10 hours a day in the factory, and a man needs just as much pure air, good light and sunshine during his working hours to keep him in health, as he needs in his hours of recreation. An atmosphere charged with dust, smoke or fumes is unfit for human respiration. Sanitary, well ventilated toilets are a necessity. When the worker wants to wash the dirt and grime from his hands, arms and face, he needs clean water in abundance and washing facilities which will invite their use. He needs a steel locker in which to place his clothes, etc., while he is working in his overalls. In the summer, and under conditions where workers are subject to great heat, there should be provided suitable shower baths which clean and refresh the wearied worker. Everywhere, whether it be in the factory, washrooms or toilets, there should be an ample supply of fresh air and light.

These several necessities were once considered luxuries, and few plants gave

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Fig. 1. A Menace to the Health of Every User

them much consideration; but today we know they are necessities, just as essential in maintaining maximum output as is fuel for the furnaces, water for the boilers, and power for the machines. A man working 8 or 9 hours a day in an industrial plant for 5 or 6 days in the week, can no more maintain his vigor of mind and body without regard being given to his welfare in this respect, than can a machine maintain its efficiency minus lubrication. The manufacturer who tries to operate a plant and get the utmost out of his workers without providing these several necessities for them, might just as well try to operate the steam engine without coal in the furnace. It can't be done. Some of the largest manufacturing plants in the United States which show a high degree of efficiency among their many thousands of employes, have expended large sums of money in providing washing facilities, proper toilets, shower baths, lighting and ventilation almost equaling that found in the large modern hotels and clubs. They have found that these large appropriations have been a good investment, and the United States Steel Corporation, which has spent far more than any other employer in the United States for such equipment, is well satisfied from a dollars and cents standpoint with the money it has expended for these purposes. It returns in increased output because the health of their employes is maintained in so satisfactory a condition that they are capable of greater exertion because of the healthful and sanitary conditions provided for them.

We will now consider the importance of washing facilities. A light, healthy washroom, with ample facilities for the men working in the factory to obtain clean water in satisfactory lavatories or troughs, is an invitation for them to use such conveniences daily, and this habit of thoroughly washing off the dirt and grime of the factory is one of the important requirements for maintaining the

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Fig. 2. Such Facilities Are Totally Unfit and Endanger the Health of Users

health of the worker. It refreshes him after the day's work. It cleanses him and removes the cause of disease, namely, dirt, germs and other impurities which are injurious to the health. He feels better, and under this healthy impulse, he is less likely to need the false stimulation of drink. To encourage cleanly habits by means of an attractive washroom equipped with the latest sanitary appliances, is a profitable policy for every industrial plant. It starts in the minds of the workers a desire for cleanliness and dislike for uncleanliness. This condition of the mind has many forms of expression, all of which are to the advantage both of the man himself and the employer. The advantage of coming out of the washroom or shower, wholesome and clean with all dirt removed, demonstrates itself in the healthy, clean, refreshing feeling which the worker enjoys. He will see the benefits of cleanliness; for instance in the work shop, which will make him inclined to be a booster for keeping the factory clean and orderly. He will advocate cleanliness among his fellow workers, if for no other reason than the selfish one; because dirty surroundings will be objectionable to him. He will appreciate what the employer has done in providing such excellent means for his welfare and comfort, and his appreciation will be expressed in greater output.

Fig. 1 shows an illustration of what one manufacturer considered adequate facilities for drinking, washing and toilet requirements! This employer needs a course in the decent and safe requirements of human beings. Look at the drinking facilities. Here we see a barrel with a removable top upon which rests that mighty germ carrier, the drinking cup, a drop from which, under the microscope, would probably show it crowded with a miscellaneous assortment of disease-breeding germs. That drinking cup alone endangers the health of everyone who uses it. Look at the washing facilities. Look at the condition of the floor, and finally look at the toilet facilities! Could any-

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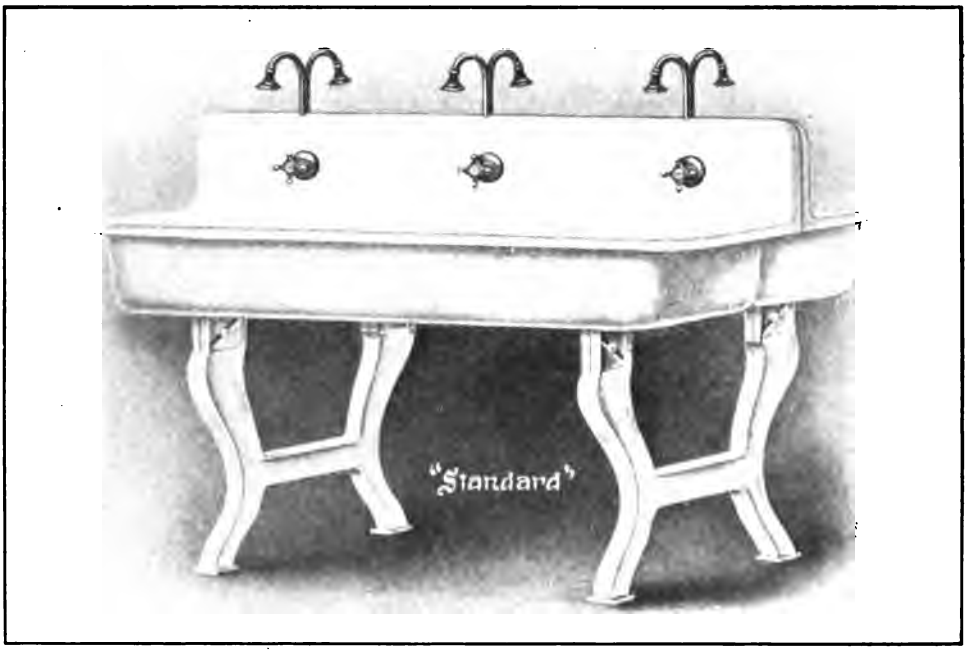

Fig. 3. Latest Type of Modern Sanitary Washing Fixture

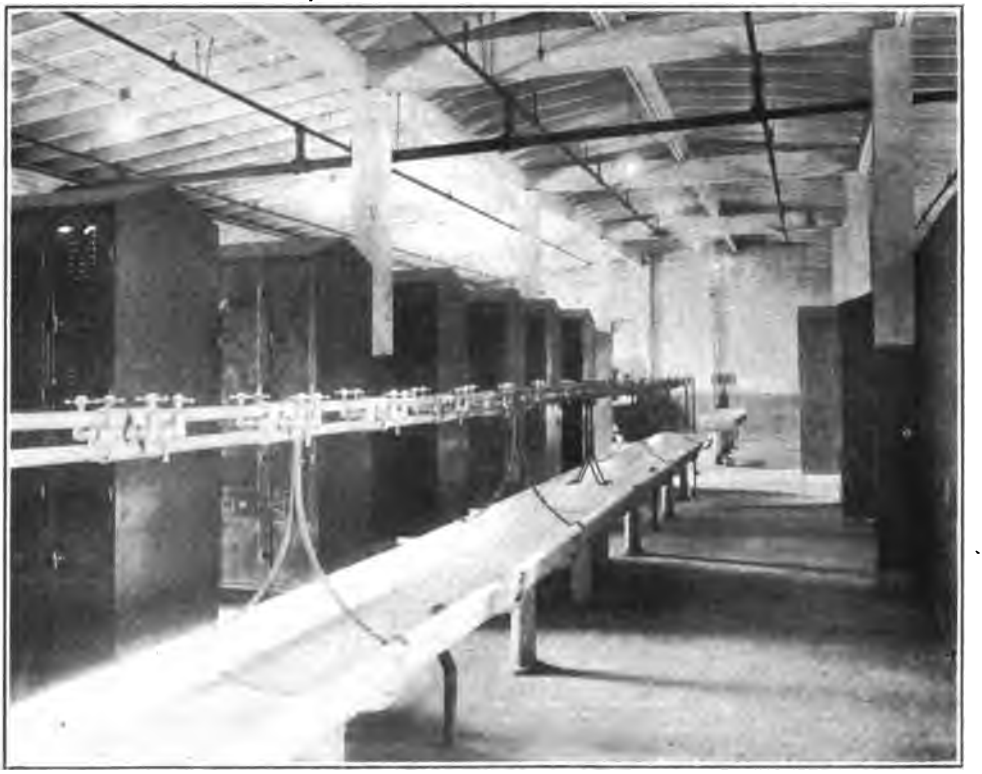

Fig. 4. Sanitary Washing Facilities in Commonwealth Steel Co.

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thing be more revolting than this miserable corner of a cellar to any person of self-respect? To utilize such facilities, the victim jeopardizes his or her health. How can any man expect his employes to use such an apology for necessary facilities, and retain any thought of respect for him or interest in the welfare of his business? This picture illustrates one of the worst investments which any employer can make, and which will undoubtedly cause him a loss every working day due to the lowering of the health standard of his employes.

Fig. 2 is another example of what no employer with any regard for the comfort and well being of his employes will permit to exist for a moment in his establishment. This employer also needs information on the elementary requirements of employes, and the prevention of disease among employes. From the illustration it is clearly evident that he is well versed in the spread of disease and ill health among his employes, for he has provided the means very fully for accomplishing this result.

Fig. 3 shows the latest design of washing facilities for use in industrial plants. The goose-neck can be arranged at a proper height so the worker can wash both head and neck conveniently. The rose-spray outlet prevents spatter, so the worker in using this type of installation can wash his head and neck without wetting his clothes. The majority of installations of this type are so arranged that the user can temper the water to suit his convenience. This type of installation meets the requirements of sanitation, because it permits the user to wash only from the flowing stream. "Wash in running water" should be the maxim in every industrial wash room. This is the type of installation which proves a good investment, because it contributes to maintaining the health of the employe, which means increased efficiency and increased output.

Fig. 4 shows a washroom in the plant of the Commonwealth Steel Company, Granite City, Ill. Note how the water supply pipes have been raised to a convenient height to allow the men to wash the head and neck under running water. This washroom is an excellent example of modern industrial requirements. It is furnished with a concrete floor which secures cleanliness. The washing facilities are modern and meet sanitary requirements. Automatic sprinkler protection has been installed to protect the building from fire, the upper part of the building is white, which, in connection with the electric light, furnishes excellent lighting. There are conveniently arranged lockers for the men's clothing. A man can enter this room, whose face and hands are covered with the dirt and dust which he collects in his work; he can here take a thorough wash, change his clothes and leave the room feeling and looking far different from when he entered.

This washroom expresses how the Commonwealth Steel Company has striven to safeguard the health of its employes and encourage habits of cleanliness. No employe can use this room daily without being impressed with the interest which his employer has displayed in his welfare and comfort by this wise investment. Experience has shown that the use of such conveniences as these tends to improve industrial labor in habits of cleanliness. A man who has been accustomed to such conveniences will not be content with unsatisfactory, unsuitable, unhealthy washing facilities. By using such a washroom as is shown in Fig. 4, the user receives an education in cleanliness, and will learn by experience the benefits of health and comfort which such facilities as these furnish. A contented mind in a healthy body is an asset to both the workman and his employer, and the means for securing and maintaining this important condition in industry can be reached by furnishing the means of cleanliness.

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Safety Enclosed Switches

By Walter Greenwood

Safety Engineer, Carnegie Steel Company, Youngstown, Ohio.

IN the "Safety First" movement there are two classes of workers. One class believes that conditions should be made such that accidents would be almost impossible. In some cases this would require new equipment, in others reconstruction; in all, perfect installation to remove as far as possible the necessity for endangering life and limb. The other class believes that people can be developed into careful beings by education, as through citing of precepts and instances, and they lay greater stress on the importance of this development than they do on the matter of constructing equipment with the view of making accidents impossible.

Switches probably play the most important part in transmitting current of all the parts in the electric transmission system and yet, with other parts of the system in absolutely perfect condition, the office of switches can be performed by very crude substitutes for switches of good mechanical construction, and that, too, without great danger if exceeding caution is exercised. This fact, which applies not alone to switches, but to installations of all kinds that could be made comparatively free from hazard by proper construction, installation and guarding, is the basis of the argument usually advanced for giving higher preference to education than to safe equipment.

Records show that numerous accidents occur from burns and shocks which might be avoided if switches were constructed with a view to avoiding accidents. Records show also that numerous accidents occur from starting machinery when it should not be started; accidents that might be avoided if properly constructed switches were in use. Of the two classes of accidents probably the last mentioned contains much the larger list of serious ones. Those that result in burns or shocks usually occur, while opening or closing switches, either at the switch or at some distant point; when replacing fuses or making adjustment of parts, as tightening connections on terminals or connecting burnt-off wires, etc. Closing switches while some one is working on the circuit at a distant point, has the greatest possibilities for serious results, as it is very liable to send the current through somebody to ground. Accidents resulting from closing switches and starting machinery unexpectedly, by persons who may or may not be authorized to operate them, occur with astonishing frequency. They occur to men working on crane runways and on trolleys or other parts of cranes; to men working under roll tables or on shop tools of all kinds used in machine shops or wood working shops—and in all manner of factory equipment where motors are used either for shaft drive or direct drive. Cases can be cited where fatalities have occurred in almost every class of possibilities mentioned in the foregoing ennumeration, but where serious accidents have occurred in every class, it should not be necessary to make citations here since all readers of SAFETY ENGINEERING must know the statement to be true if they have kept in touch with the daily occurrence of accidents or the records that are compiled.

Oil switches on high voltage circuits are necessarily constructed to comply with safety requirements, as in fact they constitute a safety appliance. Main disconnecting switches on very high potentials are safeguarded by oil switches, and it is doubtful if the methods which would apply there can be applied for enclosing switches on circuits of low voltage, yet all main line switches on circuits carrying high voltage should have latches on the blades that would fasten them shut, which could not be released unless a hook that could have an insulated handle was used. It is not our purpose to further discuss in this article switches used on circuits carrying very high voltage.

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The essential principles of a safety switch are:

All disconnecting switches used on distributing circuits, comprising main switches that control territorial groups and groups within the territory consisting of two or more switches, along with those that immediately control the current supplied to any operating part, should be perfect in workmanship and sufficient in dimensions of parts to carry current above their rated capacity. The importance of this rugged construction lies in decreased liability for flashes to occur that would impair the blades and jaws, thereby subjecting the attendant to possible injury when attention must be given a switch without taking the current off. A point that should receive consideration is perfection of blade contact to assure full carrying capacity through the contact made by blades and jaws. It is not enough that the blades and jaws have excess dimensions of contact, but they should be so rigid and perfect in workmanship that full current density at the contacts, as required in good practice, is always assured. With imperfect contact, pitting of blades and jaws begins and soon the contact becomes so imperfect that a flash may be projected when contact is broken. Also a serious waste of energy occurs through such defective contacts.

Not all switches are provided with terminals for fuses. Where they are so provided, fuses should be on the side of the circuit which is dead when switch is open. The rules of the Association of Fire Underwriters say they shall be placed on the live side. With this method all of the switch except the fuse terminals is dead when the fuses blow. Replacing fuses on the live side must be done with exceeding caution to avoid shocks or burns, and even with exercise of caution, attendants are frequently injured. As replacing fuses is the most likely requirement in connection with maintaining circuits, the chances for shocks and burns while replacing them are reduced to the minimum if they are placed on the side that is dead when the switches are open.

Switch blades should be hinged on the side that is dead when the switch is open. By doing this and with the fuses on the same side, all parts except the jaws are dead when the switch is open. Some parts of a switch must remain alive when the switch is open, but as heretofore explained the hazard is less if the jaws are alive than when the fuse terminals are alive.

Switches should be opened and closed with a quick break and quick make. By some, these qualities are not given deserved consideration; by others quick closing alone is considered. Both are important factors for safety as well as durability, but if one is more important than the other it is the quick break as the possibilities for drawing an arc by dilatory movement is the greatest in this case. Every arc drawn causes some deterioration and each successive one is more damaging.

All switches, of whatever current-carrying capacity, should be covered with a rainproof encasement. While this is not strictly necessary for switches not exposed to the weather, the importance of interchangeability justifies following a single standard. As some situations require dustproof enclosures, probably two standards of weatherproof encasement should be required on this account.

For throwing a switch without opening the door of the encasement, either a lever or a rod should be employed. Possibly the lever throw might get the highest consideration for dustproof enclosing on account of reducing friction to the minimum where packing must be used on moving parts.

Provision should be made for locking the door of an encasement with a considerable number of seal locks, the purpose being to protect, if necessary, more than one person or gangs that may be employed at the same time on the circuit controlled by a switch, in different parts of its territory, the location of workmen being unknown to one another. With such provision, each person about to do work on the circuit could place his individual seal lock on the open switch, and so long as one remained the switch could not be closed. Ordinarily it is neither necessary nor desirable to lock a switch shut, but in cases where it is proper provision should be made for attach-

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ing a suitable lock. A safety seal lock should not be used for this purpose, as its only office should be to protect from accidents under abnormal conditions. Indiscriminate use of these seal locks destroys their significance, which takes so much effort to get planted.

ACCIDENTS THAT SHOW THE NECESSITY FOR SAFETY ENCLOSED SWITCHES

A few cases to prove the necessity for safety enclosed switches: A man went into a dangerous place under machinery while the current operating it was not cut out. The operator of the machinery claimed he got the signal that everybody was in the clear, though this claim was disputed by the man said to have given the signal. The machinery was started and the man in the dangerous place was killed.

A man went on a crane trolley without informing the crane operator as was claimed. When one of the trolley motors was started he was caught in the machinery, and not until the blood dripping from his body was noticed by an employe on the floor below was it discovered that his dead body was entangled in the machinery.

A man left his crane cab and went to the end of crane farthest from the cab to make some adjustment. The relief operator, who was due to operate the crane about this time, was called on to operate it; without knowing where the other operator was, he started the bridge travel, catching the first operator between the end carriage and metal siding on a building adjoining. He was pressed through the siding and fell to a platform on the other side, where he lay for several hours before he was discovered.

A foreman went out on a crane runway to make some adjustment which required removal of a gear shield, after telling the operator not to move any part of the mechanism without orders from himself. After a time the service of the crane was required and the operator, not being able to see the foreman, took it for granted he had left the crane. He started one of the motors and the foreman's foot was caught in some of the gears, cutting part of it off.

Two men were trimming lamps from a crane runway when the crane operator started the bridge travel, catching one of the men between the trolley and a footwalk where there was but a few inches clearance. His injuries were very severe. The other man was fortunate enough to escape injury by catching on the chord of a roof truss.

A man was called upon to rearrange some light wires in a shop and, because of the low voltage on the circuit, it was not thought worth while to cut it out. An end of wire at a splice penetrated the tape around it and the glove on the man's hand when he took hold of it. The shock caused him to lose his balance, he fell from the structural piece on which he was standing and was killed by the fall.

A man attempted to disconnect a magnet while the current was on and received a shock that killed him.

A man, while connecting a line that had been burnt off during a storm to a terminal on a control board, got a short that killed him. The board was so placed that both front and back were not easily accessible from any one position. In order to reach the back of the board while holding the terminal post in position at the front, he placed one foot on a grounded controller box to raise his body higher, thus bringing it against a live switch jaw, allowing the current to pass through his body to ground.

In this case the victim escaped death by a very narrow margin and special care had been taken for avoidance of an accident. The guard was stationed at the switch to guard it and operate it as occasion required while some necessary adjustment was made to the chain of a bucket conveyor. The circuit was unintentionally closed because of the switch being defective. The switch was enclosed by a crudely constructed cast iron box, and any defects could not easily be discerned. This case illustrates the importance of rugged and perfect construction.

An account of an accident once published states: A man about to do some work on a circuit took the precaution to open the switch, disconnect the wires at the terminals and cut the wires off at some distance from the switch. Some one saw this open line and took for

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granted that it was opened by somebody for mischief. He spliced the wires, connected the terminals and threw the switch in, killing the man who had used so much caution to protect himself.

But why go on enumerating from the long list of accidents recorded, what could have been prevented by properly constructed switches? Any number of cases can be cited where persons received injuries that were trivial, yet all the elements for fatalities were just as much present as in other cases where the results were fatal.

When a switch has been supplied which embodies all the proper features for a safety switch, the old question so much discussed in the pages of SAFETY ENGINEERING bobs up, "How can employes be induced to make use of safeguards that are provided?" Further than to say our faith in the quality of those we would provide safeguards for should be sufficient to convince us they will use them without much urging, this phase of the subject is dismissed.

ERRONEOUS CONCLUSIONS IN THE EARLY DAYS

The writer must here take advantage of the opportunity offered to call attention to certain erroneous conclusions that naturally were arrived at in the early days of applying electric current to industrial uses. Adherence to these wrong conclusions and reiteration of them by those whose opinions we should respect, has a retarding effect in bringing about perfect methods of safeguarding. In a splendid paper read before the Sixth Annual Safety Congress, and published in the November issue of SAFETY ENGINEERING, the author makes the following statements, "Precautions essential for the protection of the consumer of current would be irksome if required in generating stations, and in mills and factories, where only skilled and experienced men have access to the circuits and switchboards. The continuous requirements for alterations and repairs in mills and factories make it very inconvenient to have low voltage circuits totally enclosed. It is contended that removing the casings from the enclosed conductors retards and prolongs alteration and repair operations without eliminating the electric hazard." While the statement above quoted is doubtless believed to be true by the author and by too many other persons, it is not likely he would have made it if he were familiar with some of the up-to-date installations we can point to, that disprove the statement almost wholly. Quoting from another paragraph as follows, "Miscellaneous inadvertencies will arise, as operatives will forget which line is alive; or they may become so familiar with live circuits that familiarity makes them careless." Although this may be true, the obligation to provide equipment that will remove the excuse for error or careless acts still remains. Referring to that clause of the quotations which says, "skilled and experienced men only have access to the circuits and switchboards." In the list of accidents cited above every one of them happened to skilled and experienced men. Further than that, before me now are accounts of 127 accidents, selected at random, occasioned by electrical equipment, 67 per cent of which were fatal and of them all only 7 per cent occurred to other than skilled and experienced employes. It is a mistake to think that only the non-electrical people require safeguarding from accidents with electrical equipment.

We can point to installations of electrical equipment where injury could not happen to an employe without exercise of great ingenuity, and if one should occur any excuse that would be manufactured would be without legs. We can also point to other installations of the very best make with high productive efficiency, where it would seem God's care and watchfulness could not prevent accidents. Anyhow, education alone could not.

In these days when continuous operation of equipment is so important, the saving effected through installations safe for life and limb would more than compensate for any added cost. Accidents to persons and accidents to equipment are closely related, and where one class is frequent, the other also is. Unconsciously accident prevention is discussed from the efficiency point of view when it is intended to discuss it from the humanitarian. If it were discussed from

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the humanitarian view alone there would be no argument. Eighty-eight fatal accidents in twelve months occasions a direct expenditure of $352,000. The indirect loss cannot be estimated but it seems a conservative estimate would be $352,000 more. Here we have a loss of $704,000 for one year; this calculation is based on the statement that 44 fatal accidents were caused by electricity in the State of Pennsylvania during the first half of 1917. This statement probably does not take into account the accidents caused by such inadvertent acts as starting machinery unexpectedly, etc., which migh be guarded against. The evidence at hand indicates they are more numerous than those caused directly by current.

Let me say in conclusion, that simply to cover an electric switch with a box to prevent inadvertent contact with it; supplying an improvised method of simple construction for locking it open, also supplying tags to notify that the switch must not be closed, is not a reasonable compliance with the requirements of safety for prevention of accidents from electrical equipment.

Safe and Unsafe Drinking Fountains

CONTAMINATED drinking water has unquestionably been one of the most potent agents in spreading disease in industrial plants, and it is only within the last few years that the importance of furnishing germ-free water in industrial plants has been recognized and acted upon.

Medical science has demonstrated that many of our most dangerous diseases are contracted by germs entering the mouth. The presence of these deadly germs cannot be detected by the eye. A sample of water which looks as clear as crystal may contain deadly germs which, upon entering the body, will start their destructive ravages. The trouble does not cease with the dangerous illness of the person affected. The victim transmits in his breath and saliva, both during illness and in some cases for a considerable time after illness, quantities of the same germs, therefore acting as a continual spreading agent of the disease. This being the case, it is clearly evident that under no circumstances should any person expose his lips or mouth to the saliva of any other person.

The custom—universal until quite recently—of furnishing a few cups for the use of numbers of people working in an establishment, has now been recognized as a most dangerous practice and is no longer permitted where any attempt at safeguarding life and health is undertaken. Bacteriological examinations disclose that a drinking cup used by many people is invariably a hotbed of disease germs and the necessity for abandoning this practice is self-evident.

To overcome the annoyance and expense of providing a separate drinking cup for each person, the drinking fountain was devised. The earlier types of drinking fountains, however, were not designed with sufficient regard to the laws of hygiene and sanitation, and while supplying drinking water in a convenient manner, bacteriological examinations reveal the fact that, due to their operation and method of emitting the water, dangerous germs from users collected where they could come in contact with the mouths of other consumers. The U. S. Public Health Service made an investigation in May, 1917, of the drinking fountains in use at the University of Minnesota. This investigation was undertaken to determine the sanitary condition of these fountains and if they were found to be unsatisfactory, to offer recommendations for correcting defects. The investigation embraced a study of the mechanical features of each fountain, bacteriological examinations of the parts of the fountain exposed to the lips of the consumer, and also of the water supplied to and discharged from the fountain. Samples of water were collected from taps in the various buildings to represent the water supplying the fountain, and from the jet on each fountain to represent the water discharged from the fountain. A swab was rubbed

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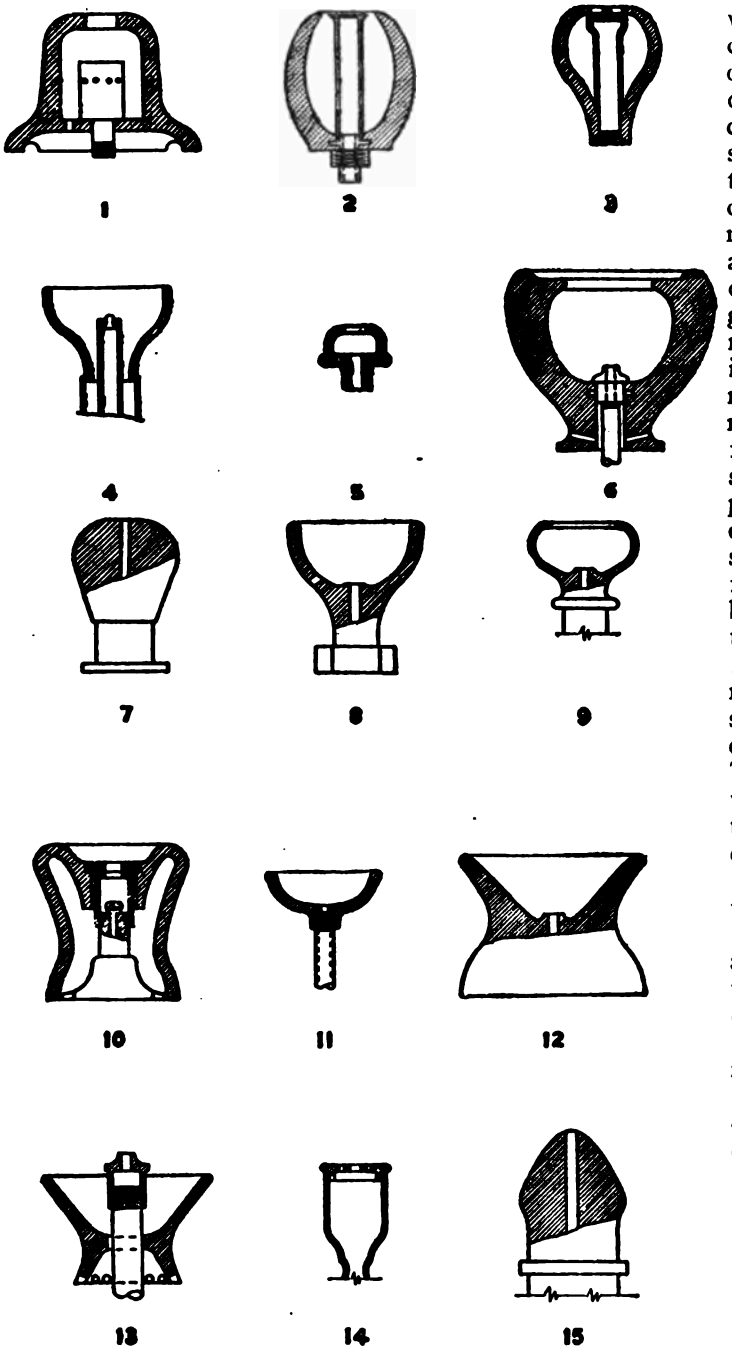

Fifteen Types of Bubblers Used in Test

over all parts of the fountain that might easily come in contact with the lips of the consumer, in order to determine the presence or absence of streptococci. The presence of streptococci was used to indicate possible contamination from the mouth of the consumer, as these organisms are commonly found in great numbers in the mouths of human beings. It must be admitted that streptococci might be contributed from other outside sources, but this is not probable under existing conditions. The water samples were examined for the total number of bacteria per cubic centimeter, for B. coli in 1 and 100 cubic centimeter amounts, and for strepococci in100 cubic centimeter amounts. The presence of B. coli was used as an indication of contamination of fecal origin.

Following the collection of the specimens for bacteriological examination, a study of the mechanical features of each type of fountain was made by removing various parts so that the details of construction could be observed.

The water supply of the main campus of the University of Minnesota is obtained from the public supply of the city of Minneapolis. This water is taken from the Mississippi River and is subjected to sedimentation, coag-

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Person Drinking from Unprotected Fountain

Person Drinking from Protected Fountain

ulation, filtration, and liquid chlorine treatment before distribution for consumption. The water supply of the department of agriculture is obtained from two drilled wells located on university property.

The results of this examination showing the largest number of bacteria per cubic centimeter of water found at the drinking point of the various types of bubblers were as follows:

Type of Bubbler	Bacteria per 1 Centimeter.
1	100
2	2
3	4
4	3
5	10
6	25
7	33
8	9
9	45
10	2
11	5
12	2
13	8
14	4
15	5

This investigation covered 77 fountains representing 15 types of bubblers which are in common use, and show the number of bacteria per cubic centimeter of water at the drinking point on any one test. Sixty-five per cent of these fountains were of the continuous-flow type and 35 per cent of the intermittent type operated by the consumer. The nozzles on all of these fountains discharged the water vertically. The height of the water jet above parts of the fountains that could be touched by the lips of the consumer was less than one inch in 40 per cent of the fountains. On examination of the various types shown, it is seen that all are subject to contamination by the consumer, either directly by the lips or by water falling back from the lips on to the jet or the surrounding parts. Certain of these types have closed receptacles around the point of discharge which retain a part of the water discharged from the outlet. Coloring matter added to these receptacles was not entirely removed for long periods of time.

The results of this investigation showed that a large proportion of the fountains were infected with streptococci, which it is reasonable to assume came from the mouths of the consumers as these organisms were not found in the water supplying these fountains; that streptococci were actually present in the

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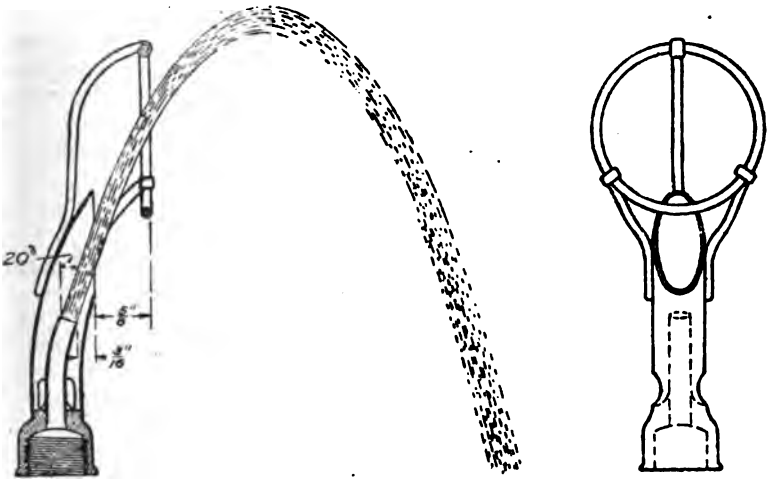

Protected Type of Bubbler. Water Discharged at an Angle.

water discharged from the fountains and could be transmitted to the mouth of a consumer even though the lips were not touched to the infected parts. These facts suggest the possibility of the fountains being a factor in the transmission of certain communicable diseases, and that certain changes should be made in their construction to eliminate this danger.

The principal defect in construction was the vertical discharge of water from the fountain. This made it necessary for the consumer to place the mouth directly over the point of discharge, and the majority of persons drank with the lips touching the discharge nozzle of the fountain. This was especially true where the water jet was low, but even when it was high enough to avoid this practice the average consumer placed the mouth over the jet and then lowered the head until the lips touched the discharge nozzle or adjacent parts of the fountain.

Experiments were conducted with various types of fountains which were designed with a view of correcting the defects noted in those already in use. It was found that the most practical construction to obviate the principal defect mentioned was to discharge the water from the fountain at such an angle that the consumer could drink without approaching the point of discharge, thus eliminating the possibility of water falling back from the mouth on the parts of the fountain at or near the point of discharge and even such a bubbler must be so designed that no saliva can drop on it.

The illustration above shows a protected type of drinking fountain bubbler which entirely protects the point of discharge, and guards the bubbler against that approach of the consumer. This bubbler can be substituted for that used on practically any of the common types of drinking fountains and can be used on the constant or intermittent-flow type.

To summarize the results of this investigation which included the 77 drinking fountains in use at the University of Minnesota, 15 different types of fountains were represented, all of which were found to be improperly constructed to prevent them from contamination by the consumer. The bacteriological examinations conducted on these fountains showed that 80 per cent were infected with streptococci and that the water from 11 per cent of these fountains contains organisms of this type which were not found present in the water supplied to the fountain. These results clearly indicate that many common types of drinking fountains can be a factor in the transmission of communicable diseases.

Employers should give attention to their drinking fountains. When it is realized that every user of a drinking

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fountain, each time he or she uses the fountain, which is often several times daily, subjects himself to the danger of contracting deadly or serious disease—should the fountain be of the non-germproof variety—the absolute necessity of using only germproof drinking fountains is apparent. Wherever drinking fountains are used a bacteriological examination should be made to determine whether the fountain is germproof or whether it is acting as a spreader of disease.

Machines That Are Hard to Guard

By Samuel C. Wilson

Factory Inspector, Brooklyn, N. Y.

Proceedings of Second New York Industrial Safety Congress

THERE are machines used for some operations that cannot always be guarded effectively, and when such a condition exists, it is very desirable to pick the right type of employe to operate the machine in a safe manner.

THE SHAPER

Take the shaper, used in the machine shop. There are many jobs done on this machine that create an extremely dangerous condition, and only extreme caution averts any one of many things happening which would cause injury. One precaution can and should always be taken on this machine, as well as with all other chip throwing machines and operations, and that is to guard against the flying chips.

THE PUNCH PRESS

The punch press is another machine that requires much study in guarding for different operations. A common practice is to fit a guard of one of the many makes to a press and use it, when possible; and in operations when the guard is not practical to throw it aside and work without it. Ten chances to one, it will not be put on again until the inspector comes along. Each operation or kind of work should be set up in the press having the best type of guard for that particular operation. Many operations on the punch press can be fitted with a home-made guard, and attached directly to the punch and die. The clutch of the press should be watched and kept in good repair and adjustment.

THE CIRCULAR SAW

The circular saw is another example. There are many guards on the market for this machine, but how many of them are practical for *all* classes of work? There is not a machine in use quite so hard to guard as the circular saw. The first thing to look out for on saws is to see that they are sharp and properly set. The proper thickness of the spreader is important. Secure the best guard possible for the class of work and attach it rigidly. Provide an effective exhaust system and when you have everything as you would want it if you were to operate it yourself, call together the employes who are to operate it, and have a good heart-to-heart talk, pointing out all hazards, and you will meet with a fair degree of success.

THE CORNER STAYING MACHINE

The corner staying machine, used in paper box manufacturing, is another example where ineffective guards are often provided. There is one type of guard for these machines that is seldom used. One of the excuses is that the springs which hold the wings in place become weak and the wings catch the finger. There is another good guard on the market for these machines. It is a patented guard and a good price is asked for it. No inspector can recommend any particular make of guard without laying himself open to suspicion. However, in operating the machine, metal fingers can be worn and adequate light provided.

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THE DOUGH MIXER

The dough mixer used in the bakery is a machine that has reaped its share of injuries. It is safe to say that 80 per cent of the bakers will take a chance and cut dough while the machine is in motion. Accidents have also been caused by the machine's starting up while the operator was cleaning it. Great care should be taken to keep the floor clean, to prevent it from becoming slippery around the machine. Employes should be trained never to put their hands inside while the machine is in motion. A safety latch or lock should be provided on the belt shifter or switch to prevent it from starting while being cleaned. The dough mixer should be provided with a cover so constructed as not to be removable when the mixer is in motion.

When installing guards, there are several points to be kept in mind, such as guarding only the danger point in a practical way and in such a manner as not to deprive the operator of light nor obstruct his vision; also durability and neatness in construction. Various types of guards are to be found that create as great hazards, if not greater, than the dangers they are meant to eliminate.

CO-OPERATION OF EMPLOYER AND EMPLOYE

The co-operation of the employe with the employer in promoting safe practices is a phase of the subject not to be overlooked. In order to promote interest in their own well being, employes should be made to feel that the rules for their conduct are not a mere whim of their employer, but are inaugurated for the sole purpose of protecting them from injuries and for preventing the recurrence of accidents that have happened. They should be shown that their own conduct has a very large influence in their physical protection.

FACTORY SAFETY COMMITTEES

One good plan that has worked well in establishing interest in safeguards and safe practices among employes is the organization of the factory safety committee made up of employes. The average size factory may have its safety committee made up of the safety engineer, who is chairman, and four employes. Two employes go out of office every three months and two others take their places. This provides for a term of six months.

Recently we have heard much relative to the percentage of industrial injuries that are prevented by education, safeguards or safe practices. Many persons have attempted to give figures as to the percentage of injuries prevented by each method. There is danger in the theory advanced by some that education will prevent the larger number of injuries and there are others who claim that carelessness is responsible for most of the injuries.

The bureau of inspection of the State Industrial Commission has had many years of experience and many difficult problems have been solved along the line of safeguarding and safe practices. After coming in contact with all classes of industry and their workers, the Commission is in a position to speak authoritatively along these lines.

INJURIES CAUSED BY FATIGUE

Far too little is known of the number of injuries caused by fatigue. We have found employers who claim that they have educated their employes in safe practices, and therefore do not need to provide safeguards. Nevertheless, the providing of proper education and the installing of safeguards and safe practices are interwoven and closely co-related.

All methods should be used by every factory owner in order to fully protect his employes from the hazards of the industry and thus bring about the elimination of injuries which may be prevented by making use of education, safeguarding and establishing safe practices. It is culpable to permit persons not familiar with the hazards existing in an industry to work therein without being properly educated as to such hazards and the proper use of safeguards, and the establishing and maintaining of safe practices in the particular industry in which they are engaged.

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Steel or Iron Supports Not Always Best

Fig. 1. Notice stack (at right) lying on its side. This stack was supported by an iron frame

PHOTOGRAPHS are here shown of the ruins of the plant of the Alberta Lumber Company, Vancouver, B. C., after a destructive fire on April 18, 1914. At the right of Fig. 1 will be seen a stack lying on its side which had been supported by an iron frame. The heat warped the frame and let the stack over. Naturally it was necessary to make extensive repairs on the stack. Fig. 2 shows the stack at the other end of the boiler house which was not included in the first picture. The second stack was supported by 12 x 12 timbers. It is in use at the present time and still stands on the same supports.

It would appear from these pictures that the authorities who insist upon steel construction work might, in some cases, be better off if they specified substantial timber work in place of metal, which, unless further protected, seems unable to "stand up" under a hot fire.

The fire resisting qualities of heavy timbers are very frequently manifested in the hottest of fires. Nothing is more commonly shown in fire pictures than upstanding timbers when nearly everything else has been leveled to the ground. When timbers are sufficiently heavy, they seldom char deep enough to destroy their strength.

The photographs are reproduced through the courtesy of Little & Loomis, insurance brokers of Vancouver, B. C.

Fig. 2. This stack was supported by timbers and is still in use on the same supports

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The Explosion at Halifax

Official Estimates of Losses and Official Photographs

IN a letter to SAFETY ENGINEERING, dated January 7, Ralph P. Bell, secretary of the Halifax Relief Committee, said that figures prepared for the American Consul-General to submit to the authorities at Washington, regarding the losses by the recent disaster, were as follows:

1. Number of persons killed? 1,300 to 1,500.

2. Number of persons injured? Over 3,000 seriously.

3. Number of persons rendered homeless by the disaster and dependent upon friends, relatives and relief committee for shelter? Close to 20,000.

4. Number of persons now (January 7) being supplied with food by relief committee? In one day this week the committee supplied food to 17,382 persons.

5. Estimated total value of all property destroyed? Impossible to estimate value of Government property. See question 10.

6. Number of homes, dwelling houses and residences destroyed? About 1,500 totally destroyed, about 1,000 partially wrecked, about 8,000 damaged.

7. Total value of such homes, residences, etc., destroyed or so badly damaged as to be impracticable of repair? About $7,500,000 estimated.

8. Total amount of damage done to houses, buildings, etc., but capable of repair? About $3,000,000.

9. (a) Estimated amount necessary for the construction of temporary shelter? About $1,250,000. (b) And including cost of feeding destitute people for a period of six months? About $1,000,000.

10. Total amount of money estimated as necessary for relief and reconstruction purposes? Between $30,000,000 and $40,000,000. Exclusive of Government property.

11. Estimated amount of relief funds now on hand or subscribed including grants from Great Britain and Canada. To December 22, 1917, $7,439,000, including $5,000,000 from British Government, and $1,000,000 from Dominion Government.

In war times it is to be expected, perhaps, that vast quantities of high explosives may find their way close to cities, as was the case at Halifax, and, some months ago, at Black Tom Island, in New York harbor, but in ordinary times that menace should not be permitted and, indeed, there are prohibitory laws on the subject for the protection of life and property. If Halifax were a large manufacturing center, such as many American cities, the losses would have been even more appalling.

Both of these explosions, Halifax and Black Tom Island, broke incalculable quantities of glass, fortunately, in each case, without taking the toll of human life and limb that might easily have been possible. For example, if the Black Tom explosion had occurred at an hour when the streets of New York were crowded with people—at noon when pedestrians overflow the sidewalks and fill the streets from curb to curb—the glass that fell in the streets, precipitated upon masses of humanity, would have killed or injured probably tens of thousands.

These recent terrific explosions indicate that hurricanes of splintered glass may have to be reckoned with in the future in city streets. Aside from making such explosions impossible, by removing the causes that produce them, there is only one protection against the flying glass hazard, namely, wire-glass windows. Wire-glass withstands violent shock and does not splinter.

The Black Tom explosion proved the value of wire glass. A large manufacturing building in the explosion zone was equipped with both ordinary glass windows and wire-glass windows. The ordinary glass windows were completely shattered, whereas the wire-glass windows held and prevented the glass from flying and injuring persons both on the inside and the outside of the building.

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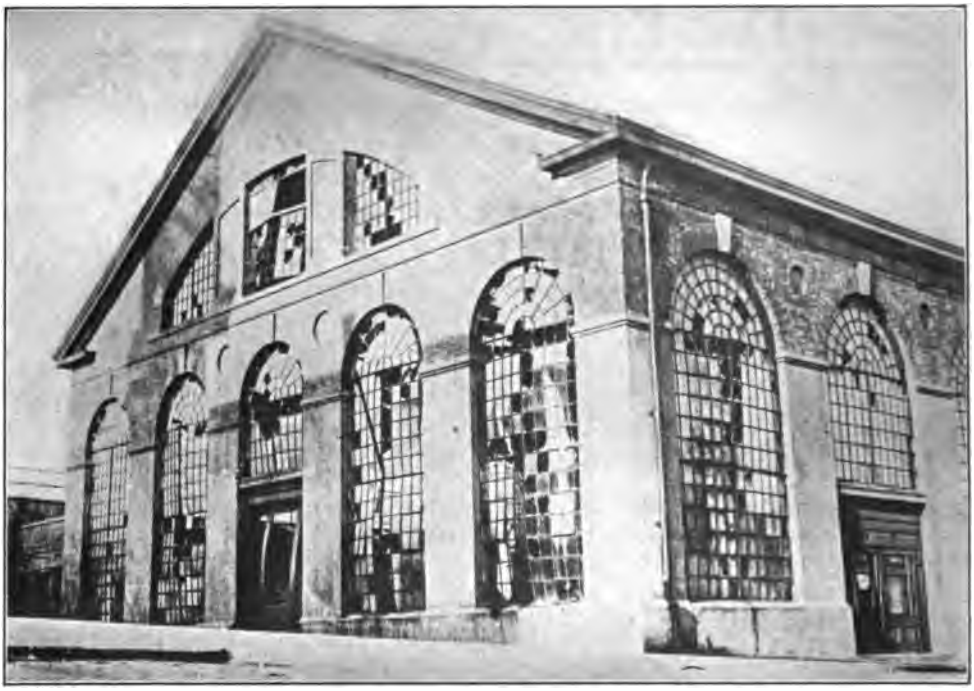

Photo from Underwood & Underwood, New York.

The City Market, a Mile and a Half from the Explosion. Structure Badly Damaged. Hardly a Window Was Unbroken

Official Photo. Passed by Canadian Military Authorities. **Copyright, A. W. Plummer, Boston.**

King Edward Hotel, Opposite North Station

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Richmond School Where 272 Children Out of 275 Were Killed

Official Photo. Passed by Canadian Military Authorities. Copyright, A. W. Plummer, Boston.

Ruins of a House Near Richmond School

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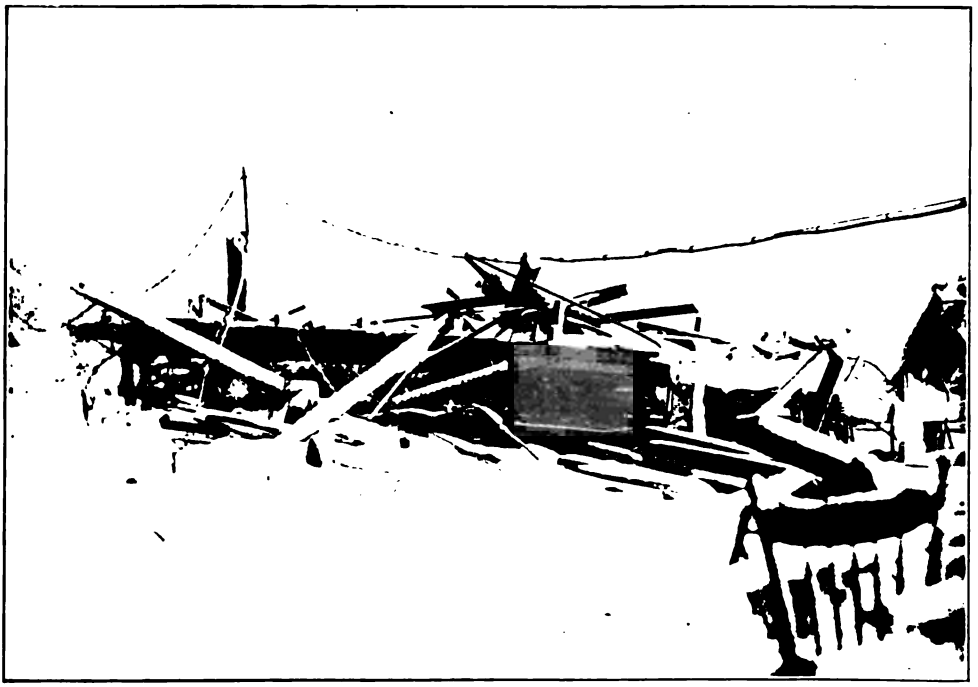
Effects of Explosion Two Miles from Water Front



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Wreck of Street Car on Barrington Street, on Which Two Men Lost Their Lives

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Mine Air, Efficiency and Coal Production

By Joseph J. Walsh

Mine Inspector, Wilkes-Barre, Pa.

PURE dry air is composed chiefly of 20.93 per cent of oxygen, 79.04 per cent of nitrogen and 0.03 per cent of carbon dioxide. Water vapor is also present in air, the amount of which will vary at different times in different places and at different temperatures. The elements of which air is composed are present in the same volume at sea level or on high mountains.

In spite of the fact that we speak of air as having a certain composition, the proportion of oxygen, nitrogen and carbon dioxide is not fixed, but varies between small limits, the different elements are not chemically united but merely mixed, each of them is free and can be separated with very little energy. By reason of this fact the air in mine workings is seldom found in a pure state.

The results of analyses of mine air samples made by the writer, show an average excess in carbon dioxide of 0.3 per cent and a decrease of 0.9 per cent in the oxygen content.

The carbon dioxide content of the air in the average coal mine will vary from one-tenth to about eight-tenths of one per cent, which amounts are not at all harmful. Three per cent of carbon dioxide in air doubles the frequency and the depth of breathing. It is plainly noticeable and if breathed continuously for several hours its effect would be harmful. Slight reductions in the oxygen content of the air, such as occur in mines, have no debilitating effect on the worker. A person not exerting himself would fail to observe any unusual physical effect in an atmosphere containing 17 per cent of oxygen. This condition, however, or even a condition showing a much higher oxygen content would indicate very poor ventilation, and that the elements which tend to reduce the efficiency of the worker are present, namely, water vapor and a high wet-bulb temperature.

The wet-bulb temperature of mine air controls almost entirely the physical condition of the human body and is the principal determining factor of the efficiency of the workmen.

The temperature of the human body is about 98 degrees F., and in order to be in a proper physical condition this temperature must be kept constant within small limits. This requirement is controlled by certain human organs, by means of which the bodily heat is expelled, aided principally by radiation and evaporation. At high temperatures the cooling effect produced by radiation is not sufficient for the needs of the body, in which case the burden is shifted to evaporation. If the relative humidity is 100 per cent or nearly so, there will be little or no evaporation. Consequently no cooling effect will be obtained from this source and the physical condition and the efficiency of the worker will reduce.

Experimental research and data collected by observation and analysis for the purpose of determining the conditions which most seriously impair the efficiency of the miner, and the atmospheric conditions necessary to permit the worker to perform the maximum amount of work without injury to health, are quite well established.

A mine begins to be uncomfortable when the wet-bulb temperature goes much above 60° F., and at 70° F., wet-bulb, the amount of work a man can perform is considerably reduced unless the velocity of the air is high.

EFFICIENCY AND COAL PRODUCTION

For the purpose of determining the extent to which the efficiency of a man

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TABLE I.

MINE NO. 1.

Before Improving Ventilation. *Sample No. 1.*		After Improving Ventilation. *Sample No. 4.*	
Carbon dioxide	0.50%	Carbon dioxide	0.32%
Oxygen	20.23%	Oxygen	20.46%
Nitrogen	79.27%	Nitrogen	79.22%
Dry-bulb temperature	68° F.	Dry-bulb temperature	69° F.
Wet-bulb temperature	65° F.	Wet-bulb temperature	60° F.
Velocity—poor.		Velocity—fair.	

MINE NO. 2.

Sample No. 2.		*Sample No. 5.*	
Carbon dioxide	0.34%	Carbon dioxide	0.15%
Oxygen	20.42%	Oxygen	20.60%
Nitrogen	79.24%	Nitrogen	79.25%
Dry-bulb temperature	68° F.	Dry-bulb temperature	59° F.
Wet-bulb temperature	67° F.	Wet-bulb temperature	57° F.
Velocity—poor.		Velocity—good.	

MINE NO. 3.

Sample No. 3.		*Sample No. 6.*	
Carbon dioxide	0.37%	Carbon dioxide	0.22%
Oxygen	20.36%	Oxygen	20.54%
Nitrogen	79.27%	Nitrogen	79.24%
Dry-bulb temperature	69° F.	Dry-bulb temperature	68° F.
Wet-bulb temperature	66° F.	Wet-bulb temperature	61° F.
Velocity—poor.		Velocity—fair.	

is reduced, and consequently the coal production, by reason of a high wet-bulb temperature, data which appear in Tables 1 and 2 were collected by the writer.

In Table 1 are presented the results of analyses representing mine air collected in three different anthracite mines before and after the atmospheric conditions were improved.

Samples 1, 2 and 3 were collected before the ventilation was improved, and samples 4, 5 and 6 were collected after the improvement. It will be noticed that the carbon dioxide is higher, and the oxygen is lower in samples 1, 2 and 3, than in samples 4, 5 and 6. These percentages, however, are not unusual, as the oxygen and the carbon dioxide content of mine air is scarcely ever normal owing to the absorption of oxygen, and the generation of carbon dioxide by the coal. The small amounts of carbon dioxide indicated by the analyses would cause no disinclination for work. The debilitating effect produced by the air conditions represented by samples 1, 2 and 3 is due to the wet-bulb temperature and the absence of sufficient velocity.

Samples 4, 5 and 6, collected in the same mines show an improvement in the wet-bulb temperature and the velocity. By reason of this improvement the coal production was increased 15.1 per cent at mine No. 1, 46.3 per cent at mine No. 2 and 26.1 per cent at mine No. 3.

Table 2 shows the results of experiments to determine the effect of different atmospheric conditions on the efficiency of the miner, and the amount of coal he can produce under different atmospheric conditions. The increased production at the different mines was accomplished, not particularly by improving the oxygen and carbon dioxide content of the air, but by lowering the wet-bulb temperature and increasing the velocity. However, as a natural consequence of an increased velocity, all the elements which go to make an ideal air condition are improved.

CONCLUSIONS

Efficiency depends upon an air condition that will allow the proper loss of heat from the body.

Efficiency will noticeably reduce when

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TABLE II.

MINE NO. 1.

Coal Production Increased 15.1% as a Result of Improved Atmospheric Conditions.

Year and Month 1917	Man-days	Number of cars of coal produced	Miners and laborers	Cars of coal produced per man per day	Average cars produced per man per day before and after improvement in atmospheric condition
January	659	899	36	1.364	
February	571	761	34	1.332	1.443
March	510	791	30	1.550	
April	493	752	29	1.527	
May	Atmospheric Conditions Improved During May				
June	635	906	32	1,426	
July	564	899	31	1,594	1,661
August	527	992	28	1,882	
September	485	846	32	1.744	

MINE NO. 2.

Coal Production Increased 46.3% as a Result of Improved Atmospheric Conditions.

Year and Month 1916	Man-days	Number of cars of coal produced	Miners and laborers	Cars of coal produced per man per day	Average cars produced per man per day before and after improvement in atmospheric condition
July	1,061	916	47	0.863	
August	1,064	991	50	0.931	
September	799	734	53	0.918	1.009
October	690	703	45	1.018	
November	700	923	41	1.317	
December	Atmospheric Conditions Improved During December				
Jan., 1917	735	1,187	35	1.615	1.477
February	828	1,110	42	1.340	

MINE NO. 3.

Coal Production Increased 26.1% as a Result of Improved Atmospheric Conditions.

Year and Month 1916	Man-days	Number of cars of coal produced	Miners and laborers	Cars of coal produced per man per day	Average cars produced per man per day before and after improvement in atmospheric condition
May	407	470	24	1.155	
June	479	567	24	1.183	1.169
July	Atmospheric Conditions Improved During July.				
August	532	795	28	1.494	
September	611	883	32	1.445	1.475
October	697	1,035	32	1.485	

the wet-bulb temperature goes above 60° F., in still air.

Efficiency increases with an increase in velocity when the wet-bulb temperature is high.

Coal production will decrease when the wet-bulb temperature goes much above 60° F., in still air.

The coal production throughout the country can be substantially increased by properly ventilating the mines that are now only fairly ventilated.

Safety Lessons of Goggles

THE steam railroad section of the National Safety Council says that one of its members takes photographs of all goggles broken while worn by shopmen in the performance of their duties, as a permanent record. The broken goggles are then sent to the tool room to have new lenses put in, and other necessary repairs made. An object lesson is thus taught by the photograph as well as by the damaged goggles, which are immediately repaired and put back into service.

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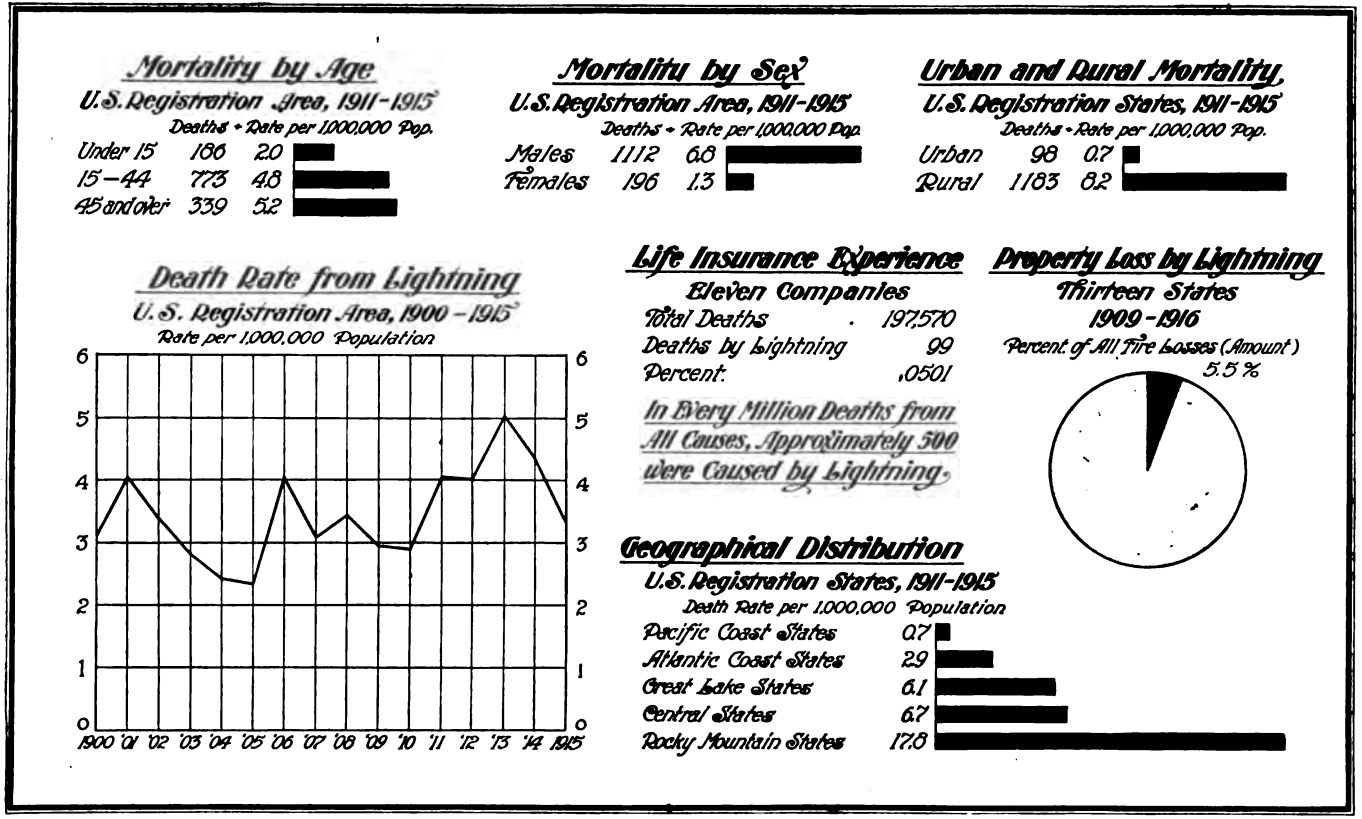
Loss by Lightning — Life and Property



Courtesy of Prudential Insurance Company.

The Prudential Insurance Company of America, under the direction of Dr. Frederick L. Hoffman, its statistician, has prepared a series of charts of very great value to all persons interested in the prevention of accidents. Through the courtesy of the Prudential, a number of the charts have been published in SAFETY ENGINEERING.

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EDITORIAL

A Duty of First Importance

1918 will be a momentous year in the annals of American industry. Democracy is now striving to make the world safe for all nations for all time, against Autocracy's pitiless aggression and enslavement. Democracy's industrial ranks are called upon to furnish the vital and necessary instruments, which, in the hands of our armies, will secure victory.

The industrial employer is an officer of Democracy. The industrial employe is today a soldier of Democracy. Democracy expects of them, in this hour of trial, full service and unswerving loyalty to its great cause. The losses our industrial army sustains are not from bullets, shells or bombs. But there is ever hovering in its midst an enemy which is truly relentless and which has already taken a terrible toll in our industrial ranks. This enemy must be reckoned with, the same as the enemy at the front. Men can be, and are, torn and mangled, made blind and limbless, injured and deformed in industry just as on the battlefield, if this arch enemy to humanity, Carelessness, is not reckoned with. It is a duty of first importance today, and at all times, that the prevention of industrial accidents on the part of both employer and employe, be a part of the day's work. To keep our industrial ranks as safe as possible from depletion through accident, is all important. This cannot be realized too thoroughly. It is a victory-policy. America expects that it will be proud of the achievements of American industry during 1918. Upon it rests, in a large measure, the victory of Democracy, and every one engaged in industry today is performing a part to accomplish this victory.

We cannot afford to lose one from these ranks. Each injury means a loss to our cause. Each accident prevented is a gain, and by making carefulness and the protection of life and limb in industry a national industrial policy, industry will maintain the efficiency which is essential to success. Let us all pull together on this proposition. Let us all encourage and do our part in safeguarding life, limb and property in industry during 1918.

Opinion of Employment Managers

IN the opinion of employment managers, who held a conference in Philadelphia several months ago, according to a bulletin issued by the United States Bureau of Labor Statistics, a few days ago, the output of labor per man could be greatly increased—perhaps as much as 60 per cent—by a rational system of management which would give due regard to the worker's health *and safety*. A proper system of labor management would provide for workers ample time and facilities for rest and healthful recreation. The employers went on record as recognizing that a changed policy must be adopted toward their employes; that the greatest waste in all industries is the waste of labor due to bad systems or no systems of handling employes, resulting in irregular work, too little work, too much work, no work, unsuitable work, no training for work, training for no work, and bad conditions of work,

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Instilling the Habit of Safety

By James L. Gernon

First Deputy Industrial Commissioner, New York

Proceedings of Second New York Industrial Safety Congress

MANY accidents are caused by resistance to reasonable discipline. In accidents resulting from carelessness, recklessness, or disobedience, the workmen alone are at fault.

Again, injuries are sometimes due to ignorance. This type of injury befalls many of the unskilled workers who enter upon their industrial lives without a knowledge of the risks they will encounter. Other accidents are due to the inherent risks of the industry which no foresight nor care on the part of the employer can prevent. For many other accidents the employer is absolutely responsible, because he does not provide the necessary safeguards. He fails to educate the ignorant workmen and makes no attempt to restrain the reckless or to secure the co-operation of the well disposed employe.

CONSIDERATION OF SAFETY COMES FIRST

It is not sufficient to spend money in equipping a plant with safeguards and seeing that they are kept in efficient condition. There should be developed a spirit of co-operation for the safety of the entire industry. The consideration of safety should become of as much importance as questions of production, selling and advertising, until it becomes a part of the establishment's industrial policy. Until this policy is adopted, the employer will not have done all in his power to protect his employes and establish the spirit of co-operation.

Standardizing safety devices would be of advantage to the employer. In one plant there may be a series of injuries which will bring to the employer's attention the necessity of safeguarding certain machines, and he becomes insistent on the protection of these points. Another plant may be immune from that particular class of injuries and the dangers seem less important. This causes a difference of opinion among employers, superintendents and foremen, and as employes pass from shop to shop their attitude toward any measure for accident prevention becomes indifferent.

SKILLED EMPLOYES TAKE RISKS

Sometimes the employe considers himself superior to the dangers which menace the ordinary person and that his superiority in quickness and skill renders him immune from accident. This induces him to take risks, and his less skillful comrades follow his example and are injured.

When purchasing new machinery, manufacturers should stipulate in the contract that the machine, when delivered, shall meet all the requirements of the factory law and afford protection to the operators or persons whose duties would bring them in contact with such machines, and, unless the machine is received in this condition the buyer should reserve the right to return the machine or make such changes as are necessary to make it safe, deducting the cost of such changes from the price of the machine.

The offering of prizes to employes for suggestions as to safeguarding machinery and eliminating dangerous conditions and practices in order to have the employes feel that they are responsible for their own safety, as well as the safety of their fellow workers, has proved effective.

MOTION PICTURES AND LANTERN SLIDES

Representatives of the Industrial Commission give talks illustrated with motion pictures and lantern slides, showing practical safeguards and safe practices for machines and processes in factories. This plan can be used in connection with labor organization meetings. In enforcing the provisions of the law, the inspector deals principally with the employer. If steps are taken, as here

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mentioned, the inspector would come in closer contact with the employe and aid in the educational work which is so necessary to prevent injuries and develop safe practices.

THE HABIT OF CAUTION

Relative to reducing carelessness on the part of employes by instilling in the minds of the employes the habit of caution, the attitude of a superintendent is reflected in the employes. It therefore becomes necessary for the burden of instilling the safety habit to rest entirely upon the department head. If the head of the plant is careless, the employes will be careless. If, however, he shows a desire to have working conditions safe and rules observed, and if he makes accident prevention one of the most important features of his department, the employes will observe the precautions which he deems necessary and emulate his example relative to the prevention of injuries.

It is often said that even if safety devices are provided, workmen will not make use of them. This is true to some extent. It is, therefore, necessary to fix the responsibility in the use of safety devices. The foreman is generally the responsible head for the workers immediately under him, for he sees that the workmen are instructed in the use of machines. He, therefore, should be held responsible for plant discipline. A new man should be thoroughly instructed before being put on a job where there are hazards. No man should be placed at any work until the foreman has inspected the conditions and has satisfied himself that such work can be safely performed.

Children's Work For Safety

By A. C. Clark

Principal, No. 9 School, Rochester, N. Y.

Proceedings of Second New York Industrial Safety Congress

THE most favorable time to teach safety is during the impressionable period of childhood. Men are Protestant or Catholic largely because their fathers were; Democrats or Republicans because their fathers were; good or bad largely because the environment of their childhood was good or bad.

We realized this fact, several years ago, in Rochester, and almost at the inception of the safety movement we began to teach it in the public schools through a definitely organized course of study.

There is special work suggested for each grade—safety at home, safety at school, on the street, on the street car, in general traveling and in industry.

We avoid making cowards out of our product. We realized that men must work in dangerous places, and do dangerous work. Scaffolds must be mounted and subways entered and high currents handled, but all must be done with the care that well assures safety in the doing.

Care about little things is of greatest importance. The pencil carelessly dropped or the pail or basket carelessly left on the stairway may cause an accident as serious in its results as a fall from a scaffold.

We have a safety committee composed of boys in each school. These committees are alive to the general safety of conditions about the school. They inspect the school building, assist at fire drills and, in some cases, act as patrolmen at dismissal and general periods of relaxation.

A suggestion from one of these committees resulted in having the Commission of Public Safety erect signs near all school buildings warning auto drivers to "Drive Slowly—School Ahead."

The committee of principals in charge of the safety course, has tried to inspire an interest in the work by making charts to illustrate the work of the grades. Books and magazines on the safety movement have been supplied, pictures procured from various corporations and many stereopticon slides made. Lectures are given and prizes offered.

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Courtesy of P. & L. E. R. R. Co.

WELL!

W. J. Canada in New Field

W. J. CANADA, well known to all safety men, has severed his connection with the Bureau of Standards, Washington, and has associated himself with the American International Shipbuilding Corporation, 140 North Broad street, Philadelphia. Mr. Canada's new duties may not permit him to engage in such active participation in committee work of the various safety agencies with which he has been affiliated, but he hopes to continue his assistance to the organizations with which he has long been associated. He is a past president of the Western Association of Electrical Inspectors, an honorary life member of the International Association of Municipal Electricians, and a member of the standardization committee of the United States Employes' Compensation Committee, the electrical committee of the National Fire Protection Association and of the Electrical Council of the Underwriters' Laboratories.

Manhattan's New Alarm System

MORE than 400 of the new street fire-alarm boxes for the Borough of Manhattan have already been installed and the work is being carried on as rapidly as possi-

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ble. The new system will be one of the most complete in the world. There will be 1,651 boxes in the completed system, compared with 816 previously, with only 10 boxes on any one circuit. The circuits will be so arranged as to eliminate the possibility of any general breakdown, which has been the chief peril heretofore.

The total cost of the system will be about $3,000,000, of which $1,600,000 is for subway construction which the city has required the Interborough Company, under the terms of its franchise, to install without cost to the city. The net expense to the city, therefore, will be $1,400,000. Fire Commissioner Robert Adamson arranged for a horizontal reduction of 1 per cent in insurance rates when the new system is completed.

Questionnaire for New R. R. Employes

THE December "News-Letter" of the steam railroad section of the National Safety Council observes that because many railroad employes have entered the Government service, it has been necessary to employ new and inexperienced men in all departments. By reason of actual conditions, the safety departments of railroads must utilize many and varied methods for reaching this class of employes. In the examination of new employes, one company has promulgated the following question form:

1. We have inaugurated a "Safety First" movement. Have we your co-operation?
2. Do you realize that both you and this company are benefited by this movement?
3. Do you know this company's intention is to hire none but careful, honest, sober and reliable men, and that your failure in either means dismissal?
4. Do you know there is nothing gained by taking chances?
5. Do you know you should never make a switching movement on street crossings and thoroughfares without first making sure there is no chance of an accident?
6. Do you know that your duty does not require you to go between cars while in motion, for any purpose whatsoever?
7. Do you know that adjusting drawbars with your feet is strictly prohibited?
8. Do you know that breaking air hose on cars with stop cocks open and with train line charged is prohibited? That both stop cocks must be closed before uncoupling hose?
9. Do you know that you should open knuckles on coupler before giving signal to engine men?
10. Do you know that cars bearing placards, such as "Inflammable," "Explosives," "Eggs," and other frail commodities should be handled with care?
11. Do you know there is much damage done to contents in cars before the cars are damaged? (Visible damage to cars does not in any way compare to the damage to cars and contents).
12. Do you know that before cutting off cars from engine you should know that sufficient brakes are in good working condition to avoid injury to cars and contents?
13. Do you know that the best safety device is a careful man?
14. Will you do your work in a safe and careful manner at all times?

Lightning's Queer Freak

A REMARKABLE story is published in a bulletin of the Indiana Fire Marshal department of the freakish behavior of a bolt of lightning at Connersville, Ind. Lightning struck the chimney of a dwelling and flashed downward through the flue to the kitchen range and the furnace in the cellar. Occupants soon became conscious of the fact that the house was extraordinarily warm. An investigation disclosed roaring fires in both range and furnace. Both the furnace and the stove had been made receptacles for waste paper and pieces of wood.

The Deadly Garage

USING this caption, J. D. Whitney of the Travelers Insurance Company, calls attention in a New York paper to the dangers of carbon monoxide in these words:

The death of Nat M. Wills, the "tramp comedian," who was asphyxiated in his own garage by his own car, points once more to the deadly peril which threatens automobilists. Prussic acid has a popular reputation as a quick agent of death, a drop on the tongue being sufficient to kill. But it is no more deadly than the carbon monoxide which is given out from the exhaust of a motor car when that motor is not running with perfect combustion. The man who runs his motor in a small garage with everything tightly shut has just about as much chance as the butterfly that the scientist puts in a mason jar with cyanide of potassium. It is only when a prominent man like Mr. Wills dies that this danger is brought to public notice; but deaths from this gas are very

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Courtesy of P. & L. E. R. R. Co.

BANISHING A PLAGUE

frequent; so frequent that scientists have given it a name. Beware of petromortis! It is so insidious that the victim does not know what is happening to him until he drops unconscious. Carbon monoxide gas is odorless and invisible. The assassin in the dark is a crude performer compared with it. The victims are nearly always found lying on the floor with the engine still running. Leave the door open. That is the preventive.

Must Speak English

INDUSTRIAL managers are growing less and less tolerant of the illiteracy of factory hands and laborers. It is realized that inability to read or understand English may result in expensive accidents. As it is difficult to induce immigrants to attend evening schools, some enterprising plants are introducing practical class studies interspersed in the day's work, and require that only English be spoken by employes when on duty.

Another "Safety" City

SPRINGFIELD, ILLINOIS, of about 60,000 population, has made provision for the passing of the wood shingle roof in that city. An ordinance has been adopted which will require the use of roofing material throughout the city which has the approval of the Underwriters' Laboratories. Buildings with wooden shingles, if damaged to the extent of 20 per cent or more by fire or any other similar cause, must be replaced with one of the fire-resisting roofing substances approved. If the property owner desires to replace a roof or repair it to a greater extent than this per cent of the entire covering, the ordinance provides that a specified standard quality of covering shall be used. A higher grade of roofing will be required on structures in the fire limits than on dwelling and frame buildings

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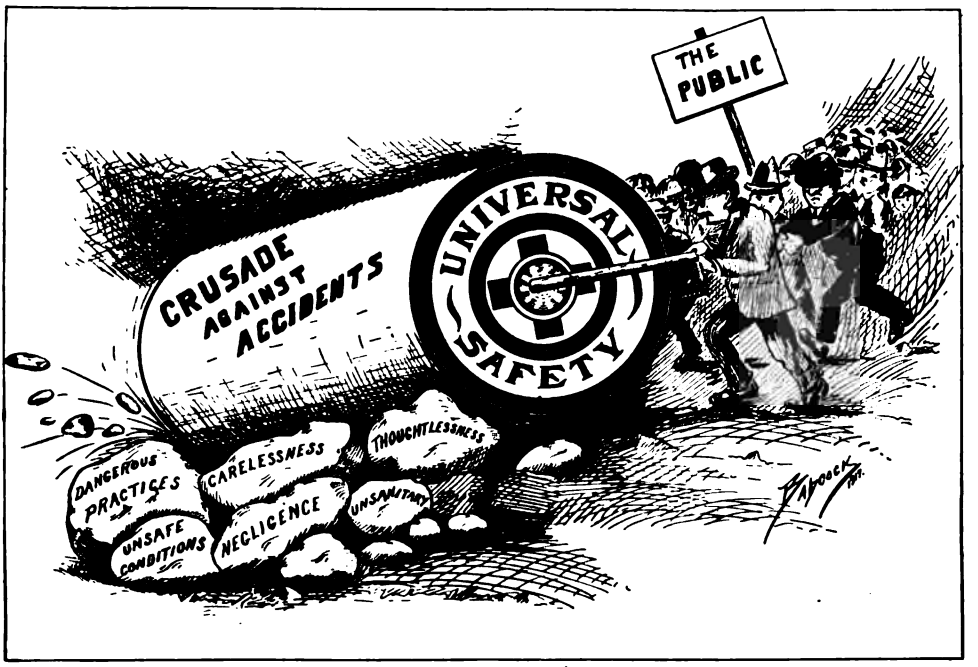

Courtesy of P. & L. E. R. R. Co.

"GET BEHIND AND PUSH"

not exceeding two stories, when not used for mercantile purposes. A fine of not less than $50 or more than $200, will be imposed for each offense or violation of the new ordinance.

Terms of Human Sustenance

IT is extremely difficult for the American people to change their complacent attitude toward fires, says *Fire Protection*. Even in a time like the present, when food is the most valuable thing we have, it takes a fire destroying food to the value of at least a quarter of a million dollars to draw even deprecating expressions from our citizens. The U. S. Food Administration cites a recent elevator fire where the company was congratulated because it carried fire insurance and lost *only* 33,000 bushels of wheat. The fire was described as "a minor fire." The comment of the Food Administration was, "If people could eat fire insurance money there might be no loss in such a 'minor fire.' But considered as bread, 33,000 bushels of wheat would feed more than 4,000 soldiers for a year or keep 20,000 Belgians alive through the winter."

To speak of a food fire loss at this time in terms of dollars or in terms of quantity is to ignore the essential meaning of food destruction. To arrive at precise meaning of food-destroying fires, the destruction must be translated into terms of human sustenance.

The Motor Maniac

"ALMOST any fair weather Sunday in almost any populous section is marked by its railroad crossing horror—an automobile full of people shooting upon the track, and often "stalling" there in front of an oncoming train; never a chance for the engineer to miss a smash. People see these horrors, or read about them, and shudder, but they give little thought to the railroad company or the trainmen that are thus forced to be shedders of human blood, takers of human life," remarks the *Railway Employes' Journal*. The motor maniac often runs by warning

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signals and flagmen and sometimes he crashes through gates and barriers in order to commit murder or suicide on the track.

Every Man Must Be Careful

ALL the rules and regulations that can be adopted, all the safety devices that can be attached to machines, all the guards that can be erected, and all the warning signs that can be posted, are useless unless every man is careful to see that they are maintained and every man is careful to warn others of danger. That is the opinion reached by every experienced safety engineer.

The Electrical Industry

STATION operators can take valuable safety suggestions from a safety engineer's advice on precautions to be observed.

Use ears and nose as well as eyes in keeping track of operating conditions. Investigate at once any suspicious sound or smell.

Treat all wires and apparatus, whether insulated or not, as alive and dangerous to touch or approach.

Examine all "dustless" dusters, brushes, etc., to make sure they are not built up with wire. Reject any such article for use around high tension or other live conductors.

Don't paint switch-hooks, insulators or anything else that is to come into contact with the high tension.

Antiquated Types of Elevators

AN inspector, who has been examining elevators in the small cities of California, says that some of them reminded him of the lifting device of the second century, B. C., which was worked by ropes coiled upon a winding drum by a capstan and levers. For instance, he says, one may find an elevator with the manufacturer's name on it, but it does not resemble the original elevator installed about 40 years ago, for when the different safety parts wore out, they were discarded, as the elevator will run without most of the safety devices. Some of these elevators are like the pocketknife that an old gentleman was displaying, saying that it was his great-grandfather's. When he was told that it looked to be in very good condition for so old a knife, he said, "Oh, yes, but I have put on two new handles, and three new blades."

Safety Work in Indianapolis

C. W. PRICE, field secretary of the National Safety Council, has inaugurated a campaign for safety education in Indianapolis, working with the safety committee of the Indianapolis Chamber of Commerce.

Electrical Inspectors' Meeting

THE thirteenth annual meeting of the Western Association of Electrical Inspectors will be held at Memphis January 29 to 31. The program will focus attention on "Winning the War," showing the uses of electricity in the army, navy, munitions plants and other war activities. A. R. Small, of the Underwriters' Laboratories, will tell what that organization is doing to assist in war work.

New York Local Council

THE annual meeting of the New York Local Council was held on January 14, at the Garret Restaurant, New York City.

The following named officers were elected to serve for 1918: A. E. Davidson, president; A. S. Regula, vice-president; W. C. Wilson, secretary and treasurer.

Accident Prevention Competition

AN accident prevention plan, in the nature of a competition, has been instituted by the Denver Gas & Electric Light Company with the object of reducing the number of accidents in its plants, thus keeping the Denver organization working at full wartime efficiency. The competition started by the Denver company is a direct result of a circular letter sent

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to all properties of the Doherty Operating Company by R. G. Griswold, chief technologist, urging the use of all possible means to avoid illness and injury at the present time when all available labor is essential to efficient operation.

The Denver company prefaced its announcement of the accident prevention program with these words: "You men who are producing heat, light and power for Denver and for the Denver industries making war supplies are performing a necessary service for your country. Every day that you are absent from work means loss for you, for the company and for the United States."

Thirteen departments are included in the accident prevention competition. Each department has a handicap so as to correct for more favorable conditions in other lines of work; thus all departments are placed upon an equal footing in the contest. The contest began on November 8 and will continue until May 1, 1918. On that date the department standing first by having fewest accidents will receive a silver trophy cup from W. J. Barker, general manager of the company. The cup will be awarded every 6 months, and the department winning the trophy three times in succession will own the cup. A cash prize of $100 will be given every 6 months to the foreman of the winning department.

One of the novelties of the contest is that the score of the respective departments will not be based upon the number of accidents, but upon the loss of time resulting from the accidents.

A New Mother Goose

A LITTLE book entitled "Mother Gooselets," consisting of warning "verselets," was distributed to children on the Saturday before Christmas by conductors of the surface cars of the New York Railways Company. The couplets were written by Theodore P. Shonts, president of the railways company. In a letter, Mr. Shonts said:

"Dear Children: I hope you will enjoy this little book. It is sent to you with the Christmas greetings of the New York Railways Company.

"I want you to have all the fun in the world, but I don't want a car to run over you and cut off your legs or your arms. Every day boys and girls get hurt while playing in the streets of New York. When you play keep away from the trolley cars. When you are on the streets look out for cars, wagons and automobiles. Do as your mother tells you. Always be careful."

The Prone Pressure Method

THE N. E. L. A. *Bulletin* cites the following case as typical of what it is possible to accomplish by the use of the prone pressure method of treatment:

A man in a construction gang had been left behind to finish some work outside a substation. He had been warned not to attempt the job while the power was on. However, to save time, he took a chance, receiving a shock of 33,000 volts, and dropped to the ground. The substation operator heard the flash and ran out, calling for help. He immediately set to work on the injured and started resuscitation. Two doctors came along and told him to stop as he would certainly kill the patient; the operator refused to do this and the doctors forcibly pulled him away from the injured man. He told them he was in charge of the case, ordered them off the company's property and went back to his work of resuscitation. Shortly afterward, two other doctors arrived, one of whom was the company's physician. He immediately began to assist the operator who, by this time, had the unconscious man partially breathing. In a short time the patient was breathing regularly and was removed to the hospital. He recovered in due time and is back at work.

War Plans for Public Highways

AT a meeting of the American Association of State Highway Officials, in Richmond, in December, plans were formulated for the preparation of a program for the improvement and maintenance, in the order of their importance, of the public highways which are of greatest economic value in the present crisis. Should lack of material and labor on highway work

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require priority ruling, the plans would be presented to the Federal authorities as a basis for National approval and authorization of work on the essential routes.

Protection for Austrian Subjects

POSTMASTER PATTEN of New York City has called attention to the notice issued by Postmaster General Burleson stating that the declaration of war with Austria-Hungary has not changed the status of citizens or subjects of Austria-Hungary residing in this country.

Deposits in the Postal savings banks of the United States, and deposits in other banks and banking institutions, belonging to citizens or subjects of the Austro-Hungarian Empire, resident in this country, are not liable to seizure by the Government and will not be taken into possession by the Alien Property Custodian. There is no reason whatever why such persons should be concerned about their property, real or personal, or their funds in bank, or securities or other investments.

Under the Trading with the Enemy Act the test of enemy character is one of residence and not nationality. The Alien Property Custodian will take into his possession only the property in this country held for, or on account of, or for the benefit of persons who are actually resident within the enemy territory.

Only Safety Matches Approved

THE Fire Chiefs' Club of Massachusetts at its 25th annual meeting named a committee with power to formulate and propose legislative measures against the sale and manufacture in Massachusetts, of all except "safety" matches, of the scratch on the box variety.

Practice "Safety First" Today

THE United Alloy Steel Corporation of Canton, Ohio, through its department of labor and safety, has bulletined these maxims of safety:

"Safety First," not part of the time, but all the time.

It may be too late tomorrow, practice "Safety First" today.

Carefulness costs you nothing. Carelessness may cost your life.

Never step in danger's way, thinking you will be quick enough to get out again.

Think, be careful.

Don't guess. Make sure. Then go ahead.

Be as thoughtful of your company's property as the company is of your welfare.

Notify your foreman of any conditions at your work place that you think dangerous or that may cause an accident.

It is the way in which our hours of freedom are spent that determines as much as war or as labor, the moral worth of a nation.

The "pull together" spirit wins in safety.

Don't place tools or other articles where they may fall and injure someone.

Protect your eyes and save yourself a life of darkness.

"Didn't think" kills thousands annually.

Every man who thinks and cares will cooperate in the safety movement.

Employes working around engines, moving or revolving machinery, shafting, etc., are warned against the danger of wearing loose clothing, long neckties, etc.

All workmen except authorized employes are forbidden to ride on engine or cars.

Do not work with battered tools. Have them repaired.

Do not clean machinery while in motion.

Carelessness is dangerous. Use the safe method in doing your work. Be Careful.

Always be as thoughtful of your fellow workers' safety as of your own.

Caution new workers against a possible injury, you were once new yourself.

Never fail to assist in avoiding and preventing accidents.

In the modern scheme of things, waste has to go! Accidents are a waste.

Get the habit of warning your fellow workmen.

Care and caution in your work are necessary for your own safety and that of your fellow employes.

Try to prevent accidents, a responsibility rests on you.

For Safe Working Garments

RESOLUTION adopted by the American Society of Safety Engineers on November 30, 1917:

"Whereas, many serious accidents are caused by the use of unsafe overalls; therefore, be it resolved that this society indorse the use of a one-piece work garment for men and women which shall be free from dangerous tails, flaps, projections and loose ends, in all industrial activities where the use of a work garment is necessary."

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Color Blindness—Loss of Sight

THE supreme court of Nebraska, in a suit against the Brotherhood of Railway Train Men, has held that color blindness, disqualifying a railroad man for further service, constitutes the complete and permanent loss of sight of both eyes, within the meaning of his insurance certificate. The policy issued by the Brotherhood of Railway Train Men provides for the payment of the face of the policy if the sight of both eyes is lost. The majority of the court held that while the sight of the complainant was not entirely destroyed for some purposes, it was deemed destroyed and lost as to the particular vocation of a railway trainman. Three members of the court filed a dissenting opinion.

Pennsylvania Accidents During 1917

DURING 1917 3,152 persons were killed and 232,425 injured in the industries of Pennsylvania, according to reports made to the State Department of Labor and Industry. In 1916 the fatal accidents numbered 2,670 and the non-fatal 251,438. During 1917 there was $7,161,094 awarded under the workmen's compensation act.

Again the Deadly Match

THE careless use of matches heads the list of dwelling house fire causes in Massachusetts during the past year, according to the report of the fire inspection department of the Commonwealth of Massachusetts, just issued. The total number of fires in dwellings during the year was 3,905. The careless use of matches heads the list of causes with 436. Fires caused by children playing with matches came second with 392. There were 324 fires started from unknown causes and 323 by ignition from lamps or stoves. Overheated stoves and cooking apparatus caused 231 fires and careless smoking started 315. Defective chimneys were the cause of 297 blazes and sparks from the same source started 214. Spontaneous combustion was given as the reason for 155 alarms and the placing of hot ashes in wooden receptacles caused 123. Among the other causes mentioned by the department in its report were: Defective heating apparatus, 49; electrical causes, 62; explosion of lamp, lantern or stove, 92; gas jet igniting other material, 80; and incendiary, 71. Scores of other causes are enumerated, among which "rats and matches" are credited with causing 83 fires.

Spotlights for Traffic Police

AFTER a number of accidents in which traffic policemen were injured by automobiles (says the *Municipal Journal*) the city authorities of St. Louis devised a method of protecting the men on duty at the crossings in the congested district. The accidents occurred principally because the street lights were not sufficiently bright to enable the officers to be seen on dark or foggy nights, so a searchlight was placed in the tenth story of a building at one of the corners. The rays were focused upon the center of the intersection where the policeman stands so that he was in the brilliant light and his signals could be readily seen. In addition the traffic man was supplied with a rubber coat and large gauntlet gloves of white material, making him as conspicuous as possible in the rain or fog. The number of accidents has decreased so noticeably since this plan was tried that five searchlights have been installed at particularly dangerous corners in the city.

Sixteen New Safety Committees

THE Executive Committee of the National Safety Council has recently appointed 16 sub-committees to re-study the activities and plans of the council for promoting a deeper national interest in the saving of human life and limb. One of the committees asks the headquarters of the Council to remind all members of the value of the interchange of ideas, experiences and information through local meetings of members. Thirty-seven local councils have been organized. Hun-

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dreds of meetings are being held throughout the year, of managers, superintendents, foremen and workmen. Safety addresses, round table discussions, the exhibition of films, etc., are features of the meetings. Many of the locals celebrate Fire and Accident Prevention Day; inspect plants from the safety standpoint; arrange for newspaper publicity of accidents, etc.

Because 75 per cent of the accident problems means the safety education of the individual, the National Safety Council believes that every State, city and town should have its organized local council for the purpose of stimulating public interest in the reduction of accidents and fires by means of meetings, publicity, conferences, inspections and in other ways.

The Council now has in its employ two field secretaries, who are spending from one to two weeks in each community where members desire their services to organize the locals and demonstrate the value of the activities.

Safety Organization Pays

A PLANT employing 1,400 men, which had speeded up to the limit, work on Government orders, reported only 20 lost time accidents during the first 11 months of 1917. Prior to that period from 20 to 30 accidents had been reported each month.

Warning of Coal Shortage

THE Factory Insurance Association of Hartford, Conn., in a circular letter to its policyholders, says in substance:

The situation as regards the coal supply is causing serious concern in many localities.

It is of the utmost importance that fire protection systems be maintained in good condition at all times. In any community where the lack of coal is being felt steps should be taken to secure sufficient fuel to maintain enough heat in the mill buildings to prevent sprinklers from freezing and to keep tanks and pumps in service. In every case an emergency reserve supply of fuel *for fire purposes only* should be provided. If it is impossible to obtain coal a supply of wood should be secured without delay. In some cases it may be feasible to install gas heating apparatus for the boiler.

The Meaning of Loss

MANY people have not a real appreciation of what the word loss means, says the United Gas Improvement Company's *Safety News*. It seems to be necessary to actually feel loss before realization of its meaning comes. This should not be. It is unfortunately too often the case in the accident prevention field. A man may pity the man on crutches, or the blind man, and at the same time take needless chances that will make him one of their number.

The warning Be Careful First is sounded from the housetops, yet frequently it falls on deaf ears. Why is this? You would not work in a powder magazine smoking a cigarette unless you were ready for immediate dismemberment. It is recognized by everybody that to do so would be extremely foolhardy, and nobody in his right senses would do it.

There are some men who are physically very strong, who chafe at safety talk. They think all such talk has a close relation to weakness. They don't feel any privation, and they fear none. They have all the component parts of their physical make-up. They borrow security that may desert them any moment. They cannot be taught. They know it all.

Self-Preservation Primordial

COMMENTING in an editorial on the safety movement, the Baltimore *News* remarks in regard to the principle, "It is capable of further emphasis until it becomes second nature with the people at large. The instinct of self-preservation is primordial, but it needs some revamping to suit modern contingencies."

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

VARIOUS INDUSTRIES—CONCERNING SMALL INJURIES.—

No. 325 There is a striking epigram at large in the American press which reads like this: "The man who is his own lawyer has a fool for a client." It could be enlarged to read further that the man who is his own doctor may have a corpse for a patient. However, intelligent thought and action may prove both untrue in certain cases.

There are more different and original, often foolish and fanatical, treatments for any one type of wound than there are types of wounds. Some of these theories advanced by laymen often strike horror to the trained mind of the physician, and are enough to give an industrial surgeon a case of apoplexy. For instance it has not been so long since that cobwebs were considered a good remedy for hemorrhage; today many believe that a quid of tobacco will prevent "blood-poisoning," that a handkerchief wrapped around a wound "will keep the cold out of it," that an ostrich-like idea of covering a wound with anything at hand is the proper treatment, that "washing out a wound" with water, often dirty, is the correct policy. To all this one answer can be given: If there is nothing absolutely clean (surgically clean) to put on a wound, do not put anything on it—leave it exposed to the open air until the surgeon sees the case. This rule is easy to follow and will prevent much grief, loss of time, and a sometime amputation perhaps.

The severe injury nearly always receives immediate and competent surgical attention; it is the small injury, the type referred to as "nothing but a scratch on the hand" which leads so often to disaster in the way of infection. A man gets a finger cut: his first instinctive action is to swear at it; his next, a purely mechanical deed, is to poke it into his mouth (that human garbage can); next he wraps a handkerchief or piece of waste on it, possibly soaking in oil at the time; then forgetfulness, then infection. The man says that he has "bad blood" or bad luck, and never stops to think that from a dirty dressing to a case of blood-poison is a simple case of cause and effect. This is perhaps the reason why it has been stated that 78 per cent of all cases of infection result from seemingly trivial injuries; it may be the reason further why a leading surgeon recently said of industrial accidents, "the smaller the wound, the more danger of infection," because it is obvious that the large injury not only gets better attention, but attends to itself better in that it drains more easily. If a Missouri mule has distemper, "treat him with respect"; likewise do the same to the small injury.

Many drugs are used as "home remedies." Of these some are worthless, some dangerous in the hands of the layman. To be brief, tincture of iodine is the reigning favorite today for the prevention of industrial infection, and it is the best drug that the medical fraternity can offer to the public at the present time. While there is nothing miraculous claimed for it, it has been pronounced 100 per cent efficient if used within 30 minutes after a wound is received, provided that the wound is not purposely contaminated before its use. A clean, surgical dressing must be placed over the wound, after covering with iodine. The dressing must not be soaked with the drug but must be put on dry. Remember that a protective surgical dressing is of more value than any drug. Remember too, that the man who wears

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gloves often obstinately refuses to wear a dressing, and yet he needs it more on account of the scratching, dirty gloves, which constantly irritate and soil the wound. To the man in the shop whose hands are greasy at the time of receiving a wound, it is well to remember that flushing the wound out with benzine or gasolene, before applying iodine is a good treatment. These remove this grease, and allow the iodine to penetrate better. Then apply iodine directly in the wound, and for about one inch on margin surrounding wound, being sure that it reaches all parts of a cut, punctured or lacerated (torn) wound. Allow to dry and put on a dry, sterile, surgical first aid dressing, taking care that this dressing is not too tight. Remember that iodine has no place in eye wounds or on sections of protruding intestine. Furthermore do not apply iodine too often, once a day being enough, regardless of how many times a dressing needs to be changed, due to its becoming too loose, too tight, dirty, or wet.

In seeking to induce men to fear small injuries, there is no intention here of "babying" them, but merely the desire for them to follow the plan of simple, effective, surgical commonsense. In meeting thousands of men in this Red Cross service, the writer has been unpleasantly amazed at the appalling number of strong ablebodied men, who suffer loss of time and physical temporary or permanent disability, because they will not, either through indifference or ignorance, do themselves justice and see that attention is given to small as well as large injuries.

The safety man is more progressive than the *first aider,* seeing the two in the light of "the best way to treat any injury is to prevent it." However so long as men will continue to get injured, trained first aid teams are vitally necessary. No shop, railroad, factory or home can consider that it is well equipped without a serviceable, well selected, and constantly inspected first aid box, and an individual or group capable of handling the same, knowing what *not* to do as well as knowing what to do.

No. 326 VARIOUS INDUSTRIES — RESULTS OF SAFETY ORGANIZATION.—Following is a summary of results obtained through the safety movement of my company for the past 8 months:

We inaugurated an educational campaign which in part was the posting of bulletins on the various bulletin boards throughout the plant. The bulletins are changed three times a week to keep the boards interesting. This has been supplemented by displaying broken goggles, stating the name of the employe who wore them and the class of work he was doing. We found that this scheme has brought home the lesson to many men, as it is an indisputable proof of the necessity for wearing goggles by those who appeared to have taken hold of the safety spirit in a light manner.

Comparative accident bulletins are issued weekly, covering each department, showing their percentage rating based on the number of employes and number of accidents. This has caused the foremen to display quite an interest in accident reduction, as they do not want to have an increase recorded for their department, but rather a decided reduction. A similar report is issued covering the monthly standing.

The company maintains an emergency hospital with day and night surgeons and assistants, where all injuries are taken care of until the employe is able to return to his work. When injured employes can perform light work, they are assigned to what is termed the "Clean-up Squad" which takes care of miscellaneous light work. They automatically drop out of the organization or squad when the company surgeon pronounces a man as being able to return to his former vocation.

The visiting nurse renders assistance to the employes and their families in case of illness; a great deal of good has been accomplished through her efforts as the employes realize that the company has an interest in their welfare.

Arrangements have been made for the testing of all goggles as they are received and to adjust them in conformity to the workmen's faces, affording the most comfort and safety. All employes

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working at hazardous occupations are provided with goggles.

All wheelbarrows are being equipped with knuckle guards to protect the men's hands from bumps and scrapes while going around corners or along narrow passageways. Ladders are being equipped with safety shoes and spikes.

Electric switches as well as other electric appliances are being enclosed and properly guarded. All cranes have been equipped so that switches may be locked open when repairs on cranes are being made; the key is kept in possession of the repairman, and switch is not unlocked until after repairs have been completed.

All employes as they enter the service of the company are presented with a polyglot bulletin embracing several languages which can be read by most classes of men we employ. This acquaints them with the fact that the company maintains an emergency hospital with instructions that they report all injuries, no matter how slight they may appear, without delay. This feature of the educational campaign has reduced the number of infections which were due to delay on the part of new men in reporting slight injuries.

Valves on feed, main and blow-down lines are locked closed when repairs or inspections of boilers are to be made.

The "danger tag" which is attached to equipment temporarily out of order, such as wheelbarrows, ladders, chains and the like, has been quite effective. A few of the tags are kept in possession of the men in authority, so they may be available for immediate use in case of emergency. The tag is not removed until after proper repairs have been made.

Regular fire inspections are made and reports submitted as to conditions in the plant; all fire hazards are eliminated as far as possible, although fire fighting facilities have been provided.

The "portable tripod" danger sign erected in such a manner as to accommodate a red light by night is placed over all openings where temporary work is being performed, also brought into use at excavations to warn men of the danger and to keep away from the place which is considered restricted territory.

The bulletin boards are electrically illuminated so that the bulletins may be read by night as well as by day.

All machines and equipment are being safeguarded and the men are provided with "safety shoes" at cost.

All this has been accomplished through directing our efforts consistently and persistently, together with cultivating the friendship of the foremen who are credited for their co-operation, as without the foremen's assistance the safety movement will not prove effective.

We all have large fields to cultivate and when the seeds are properly sown our crops should be good.

There still remains a vast area of unexplored territory which in time will be discovered as we advance in the work, which is assuming larger proportions each day.

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No. 327 VARIOUS INDUSTRIES — TEN RULES REGARDING FOREIGN BODIES IN THE EYE.—1. Remember that the eye is the most delicate, exposed part of the human machine.

2. Remember that most men who lose eyes are victims of bad methods before the oculist even sees the case.

3. When a foreign body lodges in the eye avoid further damage; do not allow the other fellow to "poke around" in it with sharp tools.

4. Remember that the man who uses dirty materials in the eye (chewed matches, handkerchiefs, and the like) is a human plague spot.

5. Do not rub affected eye with the finger—it does damage, and makes the foreign body more difficult to remove.

6. Keep flaxseed and allied "junk" out of the affected eye. Why try to exchange one foreign body for another?

7. If the foreign body cannot be removed by gently shaking the eyelid or with sterile gauze, the plain indication is to bandage the eye and seek skilled relief.

8. The use of boric (or boracic) acid as an eye-wash will remove many foreign bodies and prevent much infection. Avoid the usually dirty eye-cup.

9. Get an oculist or physician to remove the foreign body if possible. This

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is good "eye insurance." Eye infection means payroll loss.

10. Remember, above all things, that goggles constitute an excellent safety device for the human machine of sight. Do not use unprotected emery wheels or work in eye danger places without them. GET THE GOGGLE SAFETY HABIT.

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No. 328 VARIOUS INDUSTRIES — EYE PROTECTION.—All who are engaged in safety work or industrial accident prevention are well acquainted with the difficulties encountered in having goggles provided for employes engaged in work presenting an eye hazard, as well as in persuading the employes to make use of the goggles when provided. Strange to say the latter difficulty is usually the greater of the two, although in this enlightened age there are still employers of labor who maintain that such protection, especially in connection with the common emery wheel, is of little or no importance. Recently the superintendent of a large machine shop proclaimed to the writer the lack of necessity for furnishing goggles in such work, and in the next breath stated that the use of goggles had been given a trial in the shop but had been discontinued because particles of emery striking the lenses disfigured the latter in a short time so that it became impossible to see through them properly.

However there are several reasons why men prefer not to use the goggles furnished, and most of the reasons can be eliminated by a little care in selecting the goggles and keeping them in good condition.

In the case of a man devoting his entire time to grinding or chipping it is evident that a goggle with leather body will soon become very uncomfortable because of lack of ventilation. It should have a metal frame, well designed for maximum ventilation, and should be selected and properly adjusted to fit the man expected to use it. Instead of a strap around the head, bows over the ears are preferable because the goggles can then be put on and removed quickly and without removing the headdress worn for work.

Where goggles are provided at an emery wheel used by several men they should be kept in an open pigeon hole within easy reach of the operator, and should be left with the bows extended at all times so that they may be picked up and adjusted quickly, with one hand if desired. It should be the duty of the shop inspector or some designated employe to inspect the goggles several times daily, cleaning the lenses and frames and replacing them the receptacle in their proper position.

When the lenses become badly speckled by emery particles they should be renewed, or if this is impossible, new goggles should be furnished. The price of a pair of goggles is not to be compared to the value of an eye.

In short, if well fitting, well ventilated goggles are provided and kept clean and within easy reach of where they are to be used, much will have been accomplished towards eliminating the employes' antipathy to their use. In fact they will be anxious to try such attractive goggles, and when they are found always clean and handy, will soon form the habit of wearing them. And when all is said and done, safety education is nothing more or less than inducing workers to form habit of safety in their work.

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No. 329 VARIOUS INDUSTRIES—SAFETY RULES. — Safety rules have been made by my company which we expect to go a long way in helping us prevent accidents. The majority of accidents are due to haulage mainly from mine cars, though very few are serious. Following are the rules made which may help some one else to compile a similar booklet for distribution among his employes:

RULES FOR MOTORMEN

1. Stop back-poling your motor.
2. Wear lamps on your head at all times. If your pole jumps off, you are in the dark and stand a good chance of getting hurt.
3. Do not leave your motor running when you get off to throw a switch or open a door.

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4. Never let the motor stand unattended with trolley pole on the wire.

5. Take your reverse to the electrician when you quit for the day.

6. Report any broken gear shield. Also report any repairs that need attention, and which will add to your own or others' safety.

7. All wires that become bare should be mended, as they may be short-circuited, causing shock; 110 volts have killed men.

8. Be sure that all cars are "in the clear" before you attempt to pass them.

9. Report all defective track, roof, wire or guards.

10. Do not permit any one to ride on motor trip or motor except the brakeman, unless the foreman or superintendent so orders.

Brakemen should ride in car farthest from the motor, and not between the cars, nor should they run along top of loaded trip. Be careful in backing when brakeman is coupling cars, as he can easily get his hand caught.

11. Do not pile sand on rails to insulate the motor, as this may cause shock to any one coming in contact with the motor.

12. Keep your motor under control at all times.

13. If you see any dangerous places or see a means to prevent accident, won't you tell your foreman about it at once? We want your suggestions for safety.

Rules are also made for inspectors (shop foremen) and machine men, and we hope to prevent some of our accidents in this way.

Prizes for December Articles

First Prize. No. 320. W. N. Lipscomb, Field Representative, American Red Cross, Crockett, Texas.

Second Prize. No. 324. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Honorable Mention. No. 321. H. E. Wright, Director of Insurance, Worthington Pump & Machinery Corporation, Hazleton, Pa.

Other meritorious articles were contributed by H. Rocktaschel, Secretary of Safety Committee, New England Power Company, Worcester, Mass.; Joseph M. Masheck, Steinway & Sons, Long Island City, N. Y., and W. N. Lipscomb, Field Representative, American Red Cross, Crockett, Texas.

Comments by Members of the Committee

No. 320 is a talk worthy of a "place in the sun," or as a preface to a work on safety. Would respectfully recommend this to be printed and scattered broadcast among the workers of the country. Excellent!

By reading the various articles in SAFETY ENGINEERING, one may be enlightened on a certain subject which may have been a stumbling block in his work. Often good points are brought out through this medium of dissemination of information, as one man's view will assist the other.

The writer of article 320 has covered the ground pretty thoroughly, taking into consideration the various angles of the safety movement. He brings up a point that three-fourths of the accidents happen to men under 45 years of age, and I agree with him. The older employes, as a rule, are more careful. Appointing some of the older employes on the "workmen's safety committees" will have a good effect—the younger element may fall into line and practice safety.

My vote is cast for article 320. Article 324 is also a good one.

My vote for 320. The man who drops the "p" from "pluck" and trusts to "luck" is sure to get into trouble.

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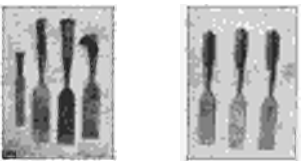
Teaching Safety by Bulletins

PACIFIC GAS AND ELECTRIC COMPANY

Safety Bulletin

Number 49 — July 15, 1927

Wood Chisels!



Which kind do you use? There are both kinds in use all over the system—far too many with split and battered handles, with no handles at all, or with dull and nicked edges.

Alameda County Electric Distribution Safety Committee reports in Recommendation No. 279:—

"Condemned chisel with no handle, in service truck No. 230.

"Recommend that spare chisel handles be available. Would suggest that if chisels were sharpened, handles would not be hammered to pieces."

R. M. SHELTON
C. J. THOMAS
M. S. LANE
} Committee

This is a very good recommendation. Dull chisels require more pounding than sharp ones.

There is another reason for broken and battered chisels—workmen try to cut out the whole gain with a single cut.

Keep the chisels repaired and sharp. Do not take too heavy cuts.

CENTRAL SAFETY COMMITTEE

POST ON YOUR BULLETIN BOARD

Emergency Preparedness

A fine-appearing emergency wagon does not make up for a poorly equipped tool chest.

All tools reserved for emergency use should afford the maximum protection to the workman. Vulcanized rubber insulation is the best we can offer. Your suggestion for a better insulation is in order.

ISSUED BY SAFETY DEPT. SECURITY ORGANIZATION, 20 VESEY ST., N. Y.

Bulletin Board Series

Bulletins Are Read by 2,500,000 Workmen Each Week
NATIONAL SAFETY COUNCIL, CHICAGO, ILL.

"Watch Your Lift"

This is one of the ways the Electrical Department at Gary Works has of boosting the Safety movement. This sign on the crane hook has a double purpose, first to impress the Safety First spirit upon all of the employes and second to call their attention to the danger of working around and with cranes.

"Watch your lift" means much as a safety precaution to all employes whose work takes them around cranes. Did you ever stop and think of the number of accidents that are caused by the hookers and craftsmen not watching their lifts? Think this over and try watching your lift all of the time and many crane accidents will be prevented.

(Courtesy of Illinois Steel Company)

POST ON YOUR BULLETIN BOARD

THE BLOW TORCH BLEW

DO NOT INDULGE IN THIS DANGEROUS PRACTICE. IT MAY BLOW YOU AS WELL AS THE METER.

USE SOAP SUDS.

FOLLOW STANDARD PRACTICE.

ISSUED BY SAFETY DEPT. SECURITY ORGANIZATION, 20 VESEY ST., N. Y.

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Letters to the Editor

ANTI-FREEZING MIXTURES

EDITOR, SAFETY ENGINEERING: On what we supposed to be good authority we became responsible for the attached utterance:

"To prevent the water in fire barrels from freezing, and to keep it sweet, in a climate with a maximum of 20 degrees below zero, add four pounds of calcium chloride, or a half a pound more if cold is liable to drop to 30 degrees below. When this non-freezing solution is used, the inside of the barrels should be coated with asphaltum, or a mixture of paraffin and rosin, to prevent the staves from shinking."

We are called down by an insurance man who says: "I have always understood that a 50-gallon barrel required from 100 lbs. to 200 lbs. of calcium chloride to keep the water from freezing in a climate of a maximum of from 10 to 20 degrees below zero."

I thought of SAFETY ENGINEERING as the best authority and would like your opinion or that of your staff.

December 3, 1917. G. F.

[Your critic is right, with the exception that he understated the matter. An average balanced solution of calcium chloride would be a 22 per cent solution, which is approximately 110 lbs. to the 50-gallon cask. This, however, could be recorded only as non-freezing up to about 14 or 15 degrees. Should a lower non-freezing temperature be desired, say 30 degrees below, it would be necessary to increase the amount of calcium chloride by some 5 lbs. per gallon or 250 lbs. to a 50-gallon cask. The cask is not usually filled above the 40-gallon mark, so this is about 2¾ lbs. to a gallon, or 187 lbs. for a *full* cask. The action of adding 4 pounds of calcium chloride to a cask of water would not be appreciable in any manner. The Underwriters' Bureau of New England has a publication called Report No. 122 (Revised), which covers the subject of freezing preventives.—EDITOR.]

OBLIQUE INGUINAL HERNIA

EDITOR, SAFETY ENGINEERING: The article on "Oblique Inguinal Hernia," by Dr. A. M. Harvey, in SAFETY ENGINEERING for November, has attracted our attention for the reason that the management of this association has for some years been fighting against the placing of the burden of "patching up" congenitally defective employes upon employers.

Early in the period of so-called workmen's compensation laws, we took the stand that indirect oblique inguinal hernia resulted from a condition which was congenital, i. e., the failure of nature to properly close the peritoneum at the point which is termed the "internal inguinal ring," and that while the existing condition may not have been known to the subject, the appearance of a "completed" hernia would in a large number of cases be attributed to some slip, strain, jar or other unusual cause which, of course, could be shown to have occurred while in the course of employment, but which in fact was merely a coincident and not a producing cause.

We have consistently stuck to our stand, although we have had an extremely hard task to convince commissioners and employes and even physicians that we were in the right. We found, at first, that most physicians did not really appreciate the conditions, and, therefore, we could not secure support from them on our theory. In time, however, we did find physicians who were enlightened enough and brave enough to stand by our theory.

We have handled several hundred of these cases and from our experience are firmer in our belief than ever before.

It occurred to us that it would be a good plan to secure actual surgical evidence in about 25 cases. Operations were performed and the conditions carefully noted. In each case the evidence sustained us. In all our experience with hernia cases, we have found but two which were true traumatic in character. One was a direct hernia caused by impalement, the other was the result of a kick by a horse. We had one case of direct inguinal hernia in a subject 63 years of age, where a preformed sac with thick walls was found protruding through the muscles but not coming through either of the "rings." The condition was due to the emaciated state of the subject. It was estimated that the sac was many years in forming, although there had been no discovery of it before an alleged strain in lifting.

Our experience has taught us that very few surgeons are inclined to take a decisive stand in the matter of hernia. Whether this is due to lack of knowledge of the anatomical conditions or otherwise, we are not prepared to say, but we have an opinion.

Employes who suffer from hernia, with perhaps honest motives, invariably attempt to fix the so-called "rupture" on to some strain, slip or other unusual movement which they can recall as having occurred while they were at work. They totally disregard all the coughing spells, sneezes, jars received on the street or elsewhere, all the intra-abdominal strains to which they are subjected every day and which are as likely to cause the appearance of the hernial condition.

Our experience denotes that Saturday night or Sunday morning is invariably the time when the appearance of the condition is discovered

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and that the subject is bathing at the moment.

The problem can be solved by having the surgeons take a positive stand in the matter, otherwise it would appear necessary to have all employes undergo an examination and their physical condition ascertained.

If examinations were demanded by employers, there would be an upheaval of industrial conditions. It is safe to say that at least 40 per cent of employes would be found in an impaired state and for that reason be assigned to the "scrap pile," producing a stringency in the able-bodied class of workmen and an oversupply in the impaired class. The labor representatives appreciate the condition and have unofficially proclaimed, "no compulsory examination."

If the word "rupture" can be eliminated from use in connection with hernia, some ground may be gained in educating employes on the exact nature and cause of hernia.

We are very glad that the National Safety Congress is going into this matter, and we sincerely hope that, in time the public generally will become further enlightened on the subject of hernia.

JOHN A. EDDY,
Secretary Employers' Mutual
Casualty Association.

Des Moines, December 19.

OIL FIRE HEROISM

EDITOR, SAFETY ENGINEERING: The following account taken from the London *Daily News* of November 24 has more than passing interest. The assembly of a pumping plant of the kind should take every factor likely to cause mishap into close scrutiny and it is most probable that such a plant could be designed to eliminate the conditions which led in this instance to fatality. Obviously the newspaper account does not give the mechanical details necessary to pass judgment, but in such installation it is evident that unnecessary risk is daily taken in contravention of "Safety First." The account describes a very unusual accident and also an unusual consequence to an unrealized danger. It is to be hoped that the lesson it enforces as to the need for consideration in laying out an oil pumping plant is daily taken into view when erecting.

A. L. HAAS.

London, November 25.

[Inclosure in Mr. Haas's letter:

Heroes of a Great Oil Fire—Superintendent Who Faced Certain Death.—A story of gallantry and self-sacrifice which cost one of those who took part his life, is told in last night's *Gazette*, which records the award of the Albert Medal in gold to Robert Leiper Lindsay, late superintendent of the Tembi Pumping Station of the Anglo-Persian Oil Company, and the Albert Medal to James Still, his assistant, for their services at a disastrous fire which destroyed part of the station.

On July 9 one of the oil pipe valves burst at a point where the pressure was 700-lb. to the square inch, and a great fountain of oil was thrown to a great height and in all directions. The burst occurred within 30 yards of the open and glowing furnaces of the boilers, and it was obvious that a disastrous fire, involving the whole station and compound, which was populated by nearly 300 natives, was a question of seconds.

The only means of averting a disaster was to turn off the oil fuel supply to the furnaces, thus extinguishing them, and to stop the pumps, thus cutting off the shower of oil.

Mr. Lindsay was near the furnaces; but to reach them it was necessary to pass through the oil shower, and thus arrive at the furnace doors soaked and dripping with oil. To do so meant almost certainly a terrible death, but Mr. Lindsay did not hesitate. Shouting to his assistant, Mr. Still, to turn off the pumps, he dashed through the oil, and had succeeded in turning off the first oil-cock when the whole atmosphere burst into flame. He staggered away, but died from his injuries some hours later.

Meanwhile Mr. Still had succeeded in turning off most of the pumps when the fire burst out. He was cut off from all doors, but managed to escape by a window, stupefied by heat and smoke. He then sought for and found Mr. Lindsay, and having removed him returned to do what he could to limit the damage. Thanks largely to his efforts a new pumping-house, which had just been established, was saved.]

AUTOMOBILE ACCIDENTS

EDITOR, SAFETY ENGINEERING: On page 454 of your magazine for December, the automobile is held up as being the greatest modern menace. I call your attention, however, to the fact that on page 401 you show that the accidents in street transportation total 6,917, of which number automobiles only contribute 2,826. This may be a great increase for automobiles, but it should be remembered that automobiles are rapidly replacing horses on the streets.

I have no sympathy with the careless automobile driver and believe that it is up to the automobile driver to take due notice of the rate automobile accidents have increased and be careful accordingly. My observation, however, has been that it is the public on the streets that is usually more careless than the automobile driver, and I believe that it is one of the duties of the public schools to educate the coming generation along the lines mentioned in your article on Problems of Public Safety.

READER.

Wilmington, Del., December 31.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

APARTMENT HOUSES

November 9, 1917. Philadelphia, Pa. Clinton apartment house. Tenth and Clinton streets. Two upper floors of 7-story building destroyed. Walls, brick. Floors, wood and concrete. Roofs, tin. Cause, not stated. Fire started in 7th story. Discovered by tenants about 5:20 a. m. Alarm, signal box. Duration, 6 hours, 40 minutes. Stopped at roof. Fire was started by strong draft, as it started in elevator shaft. Persons in building, uncertain. Killed, 2. Means of escape, fire tower and fire escapes.

BAKERIES AND CANDY FACTORIES

October 28, 1917. New Orleans, La. Klotz Cracker Company. 613-19 Schoupitoueas street. Cake and cracker factory. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, unknown. Fire started in rear on ground floor. Discovered by watchman about 8 p. m. Alarm, from fire alarm office. Duration, 9 hours. Stopped when building was consumed. Private fire apparatus, hand extinguishers. Persons in building, not stated. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $117,000.

BOOT AND SHOE FACTORIES

November 28, 1917. Malden, Mass. Middlesex Last Company. Maplewood and Eastern avenues. Manufacturing shoe lasts. One 4-story building damaged. Walls, brick and wood. Floors, wood. Roofs, tar and gravel. Cause, supposedly hot journal. Fire started in basement. Discovered by seeing flames break through side of building in 2d story about 10:30 p. m. Alarm, box. Duration, 2 hours. Stopped at upper story. Fire was favored; there were no fire stops, and fire went up outside walls and elevator shaft. Persons in building, none. Injured, 1 person slipped on ice. Means of escape, stairway at each end of building. Value of building and contents, $6,000. Property loss, $1,000. All valuable papers were protected in safe.

CHEMICAL AND PHARMACEUTICAL WORKS

November 18, 1917. Brooklyn, N. Y. Knowles-Bradley Company. 98-104 Van Dyke street. Saltpeter works. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in 1st story. Discovered by watchman about 11:10 p. m. Alarm, box. Duration, 3 hours.

FIGHTING FIRES IN WINTER

The night of December 30, owing to the extreme cold, was a memorably busy night for the New York Fire Department. The Department was called upon to answer 400 alarms on December 30. The picture shows the Excelsior Park Stables, 124-126 East 124th street, where 250 horses were cut off from the second and third floors. An attempt to heat harness oil at a stove on the first floor caused the fire.

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Stopped after spreading throughout building. Private fire apparatus, extinguishers and water buckets. Persons in building, not stated. Means of escape, inside stairways. Value of building and contents, $110,000. Property loss, $90,000.

CHURCHES

December 5, 1917. Salt Lake City, Utah. Logan Mormon Temple. Three blocks east of city. Church. One 4-story building damaged. Walls, stone. Floors, hardwood. Roofs, wood. Cause, short circuit in electric wiring. Fire started in 1st story under stairway. Discovered by passer-by who saw flames issuing from second-story window. Alarm, telephone. Duration, 3 hours. Stopped at 3d floor. Fire was favored by winding stairway, which acted as a flue; fire destroyed 3 rooms, one above the other. Persons in building, not stated. Means of escape, none. Value of building and contents, $1,000,000. Property loss, $50,000. All valuable papers protected.

COAL AND LUMBER YARDS

November 12, 1917. Narragansett Pier, R. I. The J. C. Tucker Company. Ocean road. Lumber, grain, coal and groceries. Three 2- to 3-story buildings destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, defective wiring. Fire started in woodworking mill. Discovered by a "coast guard" seeing the flames from a distance about 8:55 p. m. Alarm, telephone. Duration, 20 hours. Stopped after destroying 3 buildings. Fire was favored by inflammable construction. Private fire apparatus, 3 hydrants with hose attached, but two of them could not be reached on account of intense heat; hose was lost. Local fire department also summoned help from nearby towns. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $250,000. Property loss, $30,000.

COTTON GINS

October 24, 1917. Walnut Ridge, Ark. Murta Gin Company. Walnut street. Cotton gin. One 1-story building destroyed. Walls, corrugated iron. Floors, wood. Roofs, corrugated iron. Cause, match in cotton. Fire started near center of building about 10:30 a. m. Alarm, fire whistle. Duration, 8 hours. Fire was retarded by metal sides and roof. Firemen handicapped by delay in getting water. Private fire apparatus, chemical engines. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $25,000 to $30,000. Property loss, about $18,000.

November 3, 1917. McKinney, Tex. G. F. Thompson Company. Outside city limits. Cotton gin. One 1-story building destroyed. Walls, corrugated iron. Floors, wood. Roofs, corrugated iron. Cause, matches. Fire started in seed cotton warehouse. Discovered by employes. Alarm, telephone. Duration, about 2 hours. Stopped in building of origin. Fire was retarded by metal walls and roofs. Firemen handicapped by long distance from hydrant—could lay only one line of hose. Private fire apparatus, short length of 2-inch hose. Persons in building, 6 or 8 employes. Means of escape, ladders. Value of building and contents, $7,000. Property loss, $4,500.

COTTONSEED OIL MILLS

November 9, 1917. Muskogee, Okla. Osage Cotton Oil Company. Howard and Mill streets. Cotton oil and ginning company. Two 1-story buildings destroyed. Walls, iron and wood. Floors, wood and concrete. Roofs, iron and tar paper. Cause, unknown. Fire started in seed house around seed conveyor. Discovered by employes of oil mill about 4:30 p. m. Alarm, telephone and Gamewell system. Duration, 12 hours. Stopped at cotton gin. Fire was favored by wood construction of seed house. Firemen handicapped by small mains giving insufficient water pressure. Private fire apparatus, company's private apparatus. Persons in building, not stated. Means of escape, 1-story buildings only. Value of buildings and contents, about $350,000. Property loss, $51,420.

DWELLINGS, ORDINARY CITY

November 3, 1917. Walnut Ridge, Ark. J. F. Medearis. East First street. Dwelling in course of remodeling. One 2-story dwelling and 1-story outbuilding destroyed. Walls, wood, brick, veneer. Floors, wood. Roofs, wood. Cause, hot stovepipe, ignited wall. Fire started in outbuilding. Discovered by workmen about 10:30 a. m. Alarm, fire whistle. Duration, 1½ hours. Stopped when buildings were burned out. Fire was favored by shingle roofs. Firemen handicapped by having no water; city waterworks in course of construction—not in use as yet. Persons in building, 8 or 10 workmen. Means of escape, none. Value of buildings and contents, $8,000. Property loss, $4,000.

FERTILIZER AND ACID PLANTS

October 31, 1917. Jacksonville, Fla. E. O. Painter Fertilizer Company. Riverfront, South Jacksonville. Manufacturing fertilizer. One 3-story building partially destroyed. Walls, wood. Floors, wood. Roofs, ruberoid. Cause, ignited in chute where bone is ground. Fire started in west end of building. Discovered by watchman about 2 a. m. Alarm, telephone. Duration, about 26 hours. Stopped at west end of building. Fire was favored by wood construction. Private fire apparatus, South Jacksonville volunteer department. Persons in building, watchman only. Means of escape, none. Property loss, about $25,000.

FLATS AND TENEMENTS

November 7, 1917. Lowell, Mass. Tenement building. 11 Broughton avenue. Dwellings. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in closet. Discovered

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by neighbor about 11:19 p. m. Alarm, bell. Duration, 3 hours. Stopped at roof. Fire was retarded by fire stops in partition. Persons in building, about 60. Killed, 5; injured, 11. Means of escape, ladders; stairways were burned. Property loss, $5,000.

FLOUR AND CEREAL MILLS

November 12, 1917. Albany, N. Y. Albany Mills Company. Broadway, Plum street, 4th avenue and the river. Flour mill. One 5-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood and tin. Cause, unknown. Fire started apparently in upper floor and in cellar. Discovered by neighbors across the street about 11:35 a. m. Alarm, telephone and box. Duration, about 4 hours. Stopped inside the building. Fire was favored by a number of conveyors running full height of the building. Persons in building, not reported. Means of escape, entrance doors only. Value of building and contents, about $50,000. Property loss, $45,000.

November 12, 1917. Tamaqua, Pa. C. F. Royer. Cottage avenue and Railroad street. Dealer in flour and feed. One 1-story building and one 3-story building destroyed. Walls, wood and stone. Floors, wood. Roofs, slag. Cause, spontaneous combustion. Fire started among 750 sacks of stock feed in 1-story building. Discovered by passersby about 1 a. m. Alarm, regular system. Duration, 4 hours. Stopped at roof of 3-story building. Fire was retarded by stone walls of 3-story building, which prevented fire from spreading to other buildings. Firemen handicapped by lack of aerial truck and ladders. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $45,000. Property loss, total. All valuable papers were in safe.

FOUNDRIES AND MACHINE SHOPS

November 4, 1917. Pontiac, Mich. Pontiac Pattern & Machine Company. 52 Mill street. Pattern and machine shop, also garage and paint shop. Two 1-story buildings and one 4-story building destroyed. Walls, wood. Floors, wood. Roofs, metal. Cause, believed to be incendiary. Fire started in center of main building. Discovered by members of fire department about 4:10 a. m. Alarm, none necessary. Duration, 4 hours. Fire was favored by all wood construction. Building formerly used as knitting works and oil-soaked. Persons in building, none. Means of escape, fire escapes. Value of buildings and contents, $50,000. Property loss, $15.000. Some valuable patterns were lost in this fire.

GARAGES AND AUTO REPAIR SHOPS

November 2, 1917. Wilmington, Del. Cahill Brothers. French and 2d streets. Garage and automobile repairs. One 4-story building destroyed. Walls, brick. Foors, wood. Roofs, gravel. Cause, spontaneous combustion. Fire started in 2-story paint room and trimming shop. Discovered by emplove outside of building. Alarm, street box. Duration, 4½ hours. Stopped after adjoining building was damaged to the extent of about $15,000. Fire was favored by inflammable materials, gasoline, oils, paints, etc. Firemen handicapped by tardy alarm. Private fire apparatus, small extinguishers. Persons in building, 10. Injured, 1. Means of escape, stairways and doors. Value of building and contents, $40,000. Property loss, total.

November 26, 1917. Chicago, Ill. C. Stone & Sons. 1658 Ogden avenue. Builders of automobile bodies. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in rear of 2d story. Discovered by citizen about 8:36 p. m. Alarm, telephone. Duration, 1½ hours. Stopped when building was consumed. Fire was favored by ordinary construction. Private fire apparatus, hand pumps and portable extinguishers. Persons in building, night watchman only. Means of escape, 2 stairways and outside fire escape. Value of building and contents, $50,000. Property loss, $35,000.

GENERAL STORES

October 8, 1917. Pequot, Minn. Schrader & Co. Front street. General merchandise. One 1-story building destroyed. Walls, wood. Floors, wood. Roof, shingles. Cause, unknown. Fire started in basement. Discovered by seeing flames issuing from windows about 7 a. m. Alarm, citizen rang fire bell. No organized fire department. Duration, 3 hours. Confined to one building. Fire was favored by all wood construction. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $12,400. Property loss, total. All valuable papers were protected.

October 20, 1917. Oberlin, La. M. Funkelstein. Main street. General merchandise. Two 1-story buildings and one 2-story building destroyed. Walls, wood. Floors, wood. Roofs, paper. Cause, unknown. Fire started inside buildings. Discovered by seeing smoke issuing from windows about 9 p. m.; no fire department. Duration, 3 hours. Stopped at third building below starting point. Fire was favored by inflammable construction. Persons in buildings, 1 in each building. Means of escape, none.

November 28, 1917. Kinmount, Ont. Doherty Brothers and others. Main street. General stores. Five 1- and 2-story buildings destroyed. Walls, brick and frame. Floors, wood. Roofs, wood. Cause, defective stove. Fire discovered by persons who saw it from the street about 5 a. m. No fire department. Duration, 2 hours. Stopped at Dellman's hotel. Persons in building, 5. Means of escape, none.

HOSPITALS AND SANITARIUMS

November 10, 1917. Bryan, Tex. Dr. H. L. Fountain. Sanitarium. One 3-story (main) building and three 1-story buildings destroyed. Walls, frame. Floors, wood. Roofs, wood shingles. Cause, unknown. Fire started in northeast room in 2d story. Discovered by

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occupant of adjoining room about 1:30 a. m. Alarm, telephone. Duration, 2 hours. Stopped when 4 buildings were consumed. Fire was favored by all-wood construction. Firemen handicapped by reduced water pressure caused by being obliged to put two lines of 2½-inch hose on 4-inch water main. No other hydrant within three blocks of fire. Persons in building, 3; no patients at time of fire. Means of escape, ordinary wooden stairway only. Value of buildings and contents approximately $18,000.

HOTELS AND LODGING HOUSES

November 14, 1917. Many, La. Phillips House. Capitol street. Hotel. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in closet, supposedly. Discovered by wife of proprietor about 12:30 a. m. No fire department. Duration, about 1 hour. Stopped when building was consumed. Fire was favored by all wood construction. Private fire apparatus, volunteers—bucket brigade. Persons in building, 35. Killed, 5; injured, 3. Means of escape, doors and windows only. Value of building and contents, $8,000. Property loss, $4,500. All persons who lost their lives apparently suffocated by smoke, as all were in rooms with outside windows, but none had succeeded in reaching the windows before they fell.

INSTITUTIONAL BUILDINGS

November 14, 1917. Delaware, Ohio. Children's home. North Sandusky street. One 3-story building damaged. Walls, brick. Floors, wood. Roofs, slate and metal. Cause, unknown. Fire started in attic. Discovered by cook who went upstairs about 5 p. m. Alarm, telephone. Duration, 3 hours. Stopped at upper floors. Private fire apparatus, chemical extinguishers. Persons in building, about 80. Means of escape, stairways and fire escapes. Value of building and contents, $30,000. property loss, $7,000. All valuable papers were saved.

November 28, 1917. St. Hyacinthe, Que. Hotel Dieu Hospital. Center of city. Orphans' refuge and home for aged persons. Three 4-story buildings destroyed. Walls, stone. Floors, hardwood. Roofs, tin. Cause, unknown. Fire started in basement. Discovered by occupant about 1 a. m. Alarm, automatic. Duration, 12 hours. Stopped when all was consumed. Fire was favored by long corridors connecting the three buildings. Firemen handicapped by headway of fire before being discovered. Persons in building, 400. Killed, 1. Injured, 1 fireman; sub-fire chief killed. Means of escape, not reported to SAFETY ENGINFERING. Value of buildings and contents, $200,000. Property loss, $125,000. Valuable papers and records were burned with the buildings.

MANUFACTORIES, MISCELLANEOUS

November 3, 1917. Hall, Ontario County, N. Y. Libby, McNeill & Libby. Sauerkraut factory. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, tar paper, four thicknesses, covered with slag. Cause, incendiary; set with chemicals in hangers. Fire started in cabbage carrier on west side of building. Discovered by night watchman about 7:25 p. m. Alarm, telephone and company's whistle. Duration, 3 hours. Stopped when main building was consumed. Fire was favored by cabbage bins on west side and empty storage barrels on east side of building. There was no outside connection to the water supply and the slag roof held in dense smoke and heat. Firemen handicapped by railroad tracks and lack of water. Fire was fought entirely with chemicals. Private fire apparatus, pipe line through center of building with hose attached but no outside connection; also had 50,000 gallons water with electric motor and pump, all of which were useless. Persons in building, 1. Means of escape, not required. Value of building and contents, $175,000 to $200,000. Company had no protection for its office papers, but most of them were saved.

November 23, 1917. Monmouth, Ill. Maple City Manufacturing Company. South 8th street. Factories. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, explosion of gas enameling oven. Fire started in paint room in 2nd story. Discovered by employes about 12:40 p. m. Alarm, Gamewell system. Duration, 1½ hours. Stopped when building was consumed. Fire was retarded to some extent by fire walls between departments. Firemen handicapped by lack of sufficient water pressure. Private fire apparatus, hose and chemical extinguishers. Persons in building, 20 to 25; noon hour. Means of escape, fire escapes. Value of building and contents, $353,000. Property loss, total.

December 7, 1917. Philadelphia, Pa. Thomas Potter Sons Company. Second and Erie avenue. Manufacturing oilcloth. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, friction; cloth running over steam pipes in order to dry it. Fire started in 4th story. Discovered by employe. Alarm, box. Duration, 5 hours. Stopped at 1st story.

MERCANTILES, MISCELLANEOUS

November 1, 1917. Gainesville, Ga. J. F. Carter Company. Church and Maple streets. Wholesale grocers. One 1-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood covered with tin. Cause, unknown. Fire started near center of rear portion of building. Discovered by passerby about 10 p. m. Alarm, by person discovering the fire. Duration, short time only. Stopped near point of origin. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $60,000. Property loss, about $17,000.

November 24, 1917. Metter, Ga. W. T. Wright and Mrs. Nancy Kingery. Broad and Rountree streets. General store and dwelling. Four 1-story buildings destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause,

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defective chimney. Fire started in roof of corner building. Discovered by seeing smoke and flames about 12 noon. Alarm, pistol shots and shouting. No fire department. Duration, between 2 and 3 hours. Stopped at Rountree street. Fire was favored by old wooden buildings. Persons in building, not reported. Means of escape, open doors; 1-story buildings. Value of buildings and contents, $25,000 to $30,000. Property loss, $6,000 to $8,000. All papers of value were protected.

December 9, 1917. Wheeling, W. Va. House & Herrmann. Corner 14th and Market streets. Furniture dealers. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, mansard, covered with patent roofing. Cause, explosion of gas. Fire started in first story near freight elevator. Discovered by watchman about 5:45 p. m. Alarm, street box. Duration, 5 hours. Stopped after leaping across 14th street into another 5-story building. Fire was favored by construction of building and inflammable contents. Firemen handicapped by cold weather and high wind, falling walls and overhead wires. Persons in building, 1. Injured slightly, several firemen. Means of escape, none. Value of building and contents, $200,000. Property loss, total.

MERCANTILES, TENANT BUILDINGS

November 5, 1917. Mancelona, Mich. Wistler block. Hardware store and grocery. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by seeing flames through window about 1 p. m. Alarm, fire bell. Duration, 8 hours. Stopped in same building. Fire was favored by light construction. Persons in building, 2. Means of escape, large entrance. Value of building and contents approximately $50,000. Property loss approximately $25,000.

November 10, 1917. New Rochelle, N. Y. Downey building and other buildings. 232-236 Huguenot street; 3 dwellings on Clinton place. Stores, offices, warehouse and dwellings. Five buildings, 2- to 5-story, destroyed. Walls, brick and wood. Floors, wood. Roofs, shingles and patent roofing. Cause, unknown. Fire started in cellar of 234 Huguenot street. Discovered by policeman about 3:30 a. m. Alarm, telephone. Duration, 4½ hours. Stopped about ¼ mile from point of origin. Fire was favored by wood partitions and floors. Firemen handicapped by lack of water and low pressure. Persons in building, 1. Means of escape, none. Value of buildings and contents, $279,000. Property loss, $103,000.

December 1, 1917. Manawa, Wis. Hopkins block. Bridge street. Barber and tailor shops, shoe shop and hardware store. Three buildings, 1-, 1½- and 2-story, destroyed. Walls, brick and frame. Floors, wood. Roofs, shingles and composition. Cause, unknown. Fire started in middle building—brick walls. Discovered by neighbors about 5:15 a. m. Alarm, telephone and church bells. Duration, 2 hours. Stopped when 3 buildings were consumed. Fire was slightly retarded by brick walls. Firemen handicapped by frozen chemical engine. Private fire apparatus, hand chemicals and buckets. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $12,500. Property loss, about $5,000.

December 11, 1917. Hartford, Conn. Goodyear Tire & Rubber Company; others in building. High street. Dealers in rubber tires, printing office and hotel. One 5-story building damaged. Walls, brick. Floors, wood. Roofs, slate, Cause, unknown. Fire started in top story. Discovered by citizen about 6:45 a. m. Alarm, box. Duration, 2 hours. Stopped in same floor where it started. Firemen handicapped by cold weather. Persons in building, 50. Means of escape, stairs and fire escape. Property loss, $80,000.

MOTION PICTURE FACTORIES AND FILM EXCHANGES

November 16, 1917. Detroit, Mich. General Film Company, similar companies in building. John R. street and Elizabeth street, East. Film exchanges. One 7-story building damaged. Walls, reinforced concrete. Floors, cement. Roofs, tile. Cause, defective insulation causing short circuit. Fire started in vault in 5th story. Discovered by employe about 6.30 p. m. Alarm, box. Duration, 1 hour. Stopped in 5th story. Fire was retarded by fireproof construction; walls of brick and reinforced concrete, steel partitions. Firemen handicapped by dense clouds of smoke and fumes from burning films. Private fire apparatus, sprinkler system. Persons in building, not stated. Means of escape, outside fire escapes. Value of building and contents, $1,393,000. Property loss, $119,550.

OFFICE BUILDINGS

November 26, 1917. Johnstown, Pa. Dibert office building. Main and Franklin streets. Drug store, shoe store and offices. One 4-story building damaged. Walls, brick. Floors, wood and concrete. Roofs, tar and gravel. Cause, unknown. Fire started in basement. Discovered by smoke coming through floor about 9:20 a. m. Alarm, Gamewell system. Duration, 1½ hours. Stopped at 1st story. Fire was retarded as there was no draft in cellar. Firemen handicapped by wood partition; prevented pouring water on fire, which was finally extinguished by running cellar pipes through holes cut in concrete floor in drug store. Persons in building, 21. Means of escape, stairway and 1 fire escape. Value of building and contents, $150,000. Property loss, $15,000. All valuable papers were adequately protected.

OIL WORKS AND TANKS

November 3, 1917. Buffalo, N. Y. Elmer E. Harris & Co. Elk street near Illinois street. Oil filtering works. One 3-story building damaged, 1-story shed destroyed. Walls, brick and frame. Floors, wood. Roofs, tar and gravel. Cause, explosion. Fire started in cen-

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ter of main building. Discovered by noise of explosion about 3:39 p. m. Alarm, box. Duration, 30 minutes. Stopped at building where it started. Persons in building, 4; Killed, 2. Injured, 1 person burned. Means of escape, outside fire escapes and stairway in center of building. Value of building and contents, $60,000. Property loss, $5,000.

PUBLIC BUILDINGS

December 5, 1917. Plainville, Conn. Town Hall. Pierce street. Town business. One 3-story building partially destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, defective electric wiring. Fire started between ceiling of fire department parlors and stage floor. Discovered by passerby about 11:07 a. m. Duration, 3 hours. Stopped after roof had fallen in. Fire was favored by wood construction. Firemen handicapped by having no ladders to reach the roof. Private fire apparatus, Bristol hose company and New Britain company No. 4 with La France pump. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $20,000. Property loss, $11,000. Papers of value all saved.

RAILROAD PROPERTY

October 21, 1917. Bay City, Mich. Pere Marquette R. R. Foot of Atlantic street. Locomotive roundhouse. One 1-story building destroyed. Walls, wood. Floors, earth and cinders. Roofs, wood, gravel covering. Cause, unknown. Fire started in southwest corner of building. Discovered by employe about 9:30 p. m. Alarm, fire alarm telegraph. Duration, 2 hours. Stopped when building was completely destroyed. Fire was favored by wood construction. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $43,000. Property loss, $5,000.

SCHOOLS AND COLLEGES

November 16, 1917. Asheville, N. C. Catholic Hill school. Catholic avenue. City school (colored pupils). One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in hallway on ground floor. Discovered by a teacher about 11:30 a. m. Alarm, telephone. Duration, several hours. Stopped when building was consumed. Fire was retarded by brick walls which prevented its spread to buildings nearby. Firemen handicapped by tardy alarm. Fire had spread throughout building when alarm was given. Private fire apparatus, extinguishers. Persons in building, 325 pupils and 7 teachers. Killed, 7. Injured, 4. Means of escape, 4 grade openings and fire escape. Value of building and contents, $14,000. Property loss, total. Part of records and valuable papers were burned.

November 27, 1917. Dallas, Tex. Southern Methodist University. Three miles north of Dallas. South Hall—dormitory building. One 3-story building destroyed. Walls, brick veneer. Floors, wood. Roofs, wood and composition. Cause, unknown. Fire started inside building. Discovered by porter who was cleaning room about 9 a. m. Alarm, telephone after fire had gotten beyond control. Duration, 3 hours. Stopped in same building. Fire was favored by all wood construction. Firemen handicapped by lack of water; private supply and enough only for 3 lines of hose. Private fire apparatus, water mains. Persons in building, 1. Injured, 2 students by falling brick. Means of escape, 2 stairways.

TANNERIES

October 27, 1917. Roxbury, Mass. Globe Tanning Company. Ellsworth place. Tanning and dressing leather. Three buildings destroyed—1, 2 and 2½ stories. Walls, no walls; wooden uprights and partitions. Floors, wood, saturated with grease and oil. Roofs, wood and tar and gravel. Cause, unknown. Fire started presumably in center of 1-story building. Discovered by neighbor about 30 feet away about 2:34 a. m. Alarm, box. Duration, 3½ hours. Stopped when surrounded by engine streams on all sides. Fire was favored by old wood material where grease and oil had been in use for more than 50 years. Firemen handicapped by insufficient water pressure where dead-end hydrants were situated. Persons in building, none. Means of escape, none; open construction. Property loss, $20,000.

TEXTILE MILLS

November 6, 1917. Mohnton, Pa. W. G. Leininger. Near Summit street. Hosiery mill. One 3-story factory building and eight 1- and 2-story stables destroyed. Walls, wood. Floors, wood. Roofs, tin and ruberoid. Cause, unknown. Fire started between boiler room and dye house. Discovered by neighbors about 3 a. m. Alarm, blowing factory whistle. Duration, 2½ hours. Stopped in basement. Fire was favored by wood construction. Firemen handicapped by lack of water pressure: town's sole apparatus consists of 500 feet of 2½-inch hose. Private fire apparatus, one company from Reading rendered valuable assistance. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $50,000. Contents of safe found to be unharmed.

THEATERS AND AMUSEMENT PLACES

October 23, 1917. Bay City, Mich. Wenonah theater. 806-808 N. Water street. One 3-story building damaged. Walls, brick. Floors, wood. Roofs, wood, gravel covering. Cause, unknown. Fire started in basement. Discovered by policeman. Alarm, telephone. Duration, 1½ hours. Stopped at rear of building. Fire was favored by inflammable construction. Persons in building, none. Means of escape, several exits. Value of building and contents, $45,000. Property loss, $7,000.

WOODWORKERS

September 27, 1917. Houston, Tex. Hirsch Cooperage Company. 406 Clark street. Cooperage plant. One 1-story building and 5

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box-cars destroyed. Walls, corrugated iron and wood. Floors, wood. Roofs, corrugated iron. Cause, unknown. Fire started in boiler room. Discovered by watchman about 11:10 p. m. Alarm, telephone and Gamewell system. Duration, 7 hours, 20 minutes. Stopped at main building. Fire was favored by inflammable materials in building. Persons in building, watchman only. Means of escape, 1-story building only. Value of building and contents, $19,000. Property loss, $14,810.

October 26, 1917. Savannah, Ga. Savannah Engineering & Construction Company. River front 8 miles west of corporation limits. Shipbuilding plant. Two store rooms and workship burned; 1 and 2 stories. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in store room. Discovered by watchman about 9:05 p. m. Alarm, telephone and box. Duration, about 2 hours. Stopped when 3 buildings were destroyed. Fire was favored by all wood construction. Firemen handicapped by having to lay long lines over bad roads, and obstructions in yards. Private fire apparatus, hydrants with hose lines attached. Persons in building, 1. Means of escape, ample openings.

November 6, 1917. St. John, N. B. J. E. Moore. South Bay—village 5 miles from St. John. Manufacturing wooden pails and buckets. Four 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, shingles covered with iron. Cause, unknown. Fire started in mill building. Discovered by watchman about 11 p. m. No fire department. Duration, 4 hours. Stopped when buildings were all destroyed. Fire was favored by wood construction. Persons in building, none. Means of escape, none. Value of buildings and contents, $100,000. Property loss, total.

November 21, 1917. Dickson, Tenn. Dickson Planing Mills. South Dickson. Planing mill and manufacturing flooring; at time of fire mill was turning out tent sticks for army use. Nine 1- and 2-story buildings destroyed. Floors, earth and wood. Roofs, composition. Cause, unknown. Fire started near engine. Discovered by watchman about 10:30 p. m. Alarm, whistle. Duration, 3 hours. Stopped when buildings were consumed. Fire was favored by inflammable construction and stock. Firemen handicapped by defective fire plug; connection came out. Private fire apparatus, 500 feet hose. Persons in building, night watchman. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $75,000. Property loss, total.

November 28, 1917. Cambridge, Mass. T. Robinson & Sons. 442 Massachusetts avenue. Manufacturing furniture. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, defective electric wires. Fire started in 2nd story. Discovered by neighbors about 9:08 p. m. Alarm, street box. Duration, 3 hours. Stopped at 4th story. Fire was favored by wooden interior construction. Persons in building, none. Means of escape, iron fire escapes on rear of building. Value of building and contents, $21,167. Property loss, total.

December 5, 1917. Youngstown, Ohio. Fred Hoffman Sons. 1107-09 West Rayen avenue. Planing mill and lumber yard. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, short circuit in switch box. Fire started in switch box in 2nd story. Discovered by watchman about 2:46 a. m. Alarm, telephone. Duration, 4 hours. Stopped when building was totally destroyed. Fire was favored by frame construction; building full of dust and shavings. Firemen handicapped by tardy alarm. Persons in building, none. Means of escape, stairway. Value of building and contents, $19,500. Property loss, $9,000.

KILLED AND INJURED IN FIRES

November 2, 1917. Wilmington, Del. Cahill Brothers. Garage and repair shop. One person injured.

November 3, 1917. Buffalo, N. Y. Elmer E. Harris & Co. Oil Filtering plant. Two lives lost, 1 person burned.

November 7, 1917. Lowell, Mass. Tenement building. Five lives lost, 11 persons injured.

November 9, 1917. Philadelphia, Pa. Clinton apartments. Two lives lost.

November 14, 1917. Many, La. Phillips Hotel. Five lives lost (all apparently suffocated by smoke in their rooms), 3 persons injured.

November 16, 1917. Asheville, N. C. Catholic Hill (colored) school. Seven lives lost, 4 pupils injured.

November 27, 1917. Dallas, Tex. Southern Methodist University. South Hall, a dormitory. Two students injured by falling brick.

November 28, 1917. Malden, Mass. Middlesex Last Company. One person injured—slipped on ice.

November 28, 1917. St. Hyacinthe, Que. Hotel Dieu Hospital. Sub fire chief killed, 1 fireman injured.

December 9, 1917. Wheeling, W. Va. House & Herrmann. Furniture dealers. Several firemen slightly injured.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

WIEGAND CHAIN SCREEN DOORS FOR OVEN AND FURNACE OPENINGS

Everyone who has had to work around ovens and furnaces knows what discomfort has to be endured by the attendants from the heat and gases coming out through the uncovered opening, when the doors are thrown open, and, further, what a chilling effect the inrushing cold air has upon the interior of the furnace and its contents. Doors, however, must be opened, be it to renew the charge, manipulate the contents, or study the interior conditions.

The E. J. Codd Company, Baltimore, Md., placed on the market the Wiegand Chain Screen Door to protect workers around the furnace. This Chain Door acts as a shield both to the operator against the heat and to the furnace by preventing the cold air from entering when the furnace doors are open.

These Chain Screens can be used in connection with drop forge furnaces, steel annealing ovens, chemical furnaces, cupolas, electric furnaces, copper, zinc and steel furnaces, porcelain kilns, coke ovens and the furnaces of stationary and marine boilers. In fact, wherever a furnace or oven kept at a high temperature has to have the ordinary door thrown open for feeding or manipulation of the contents, these auxiliary chain doors prove their usefulness by protecting the interior from the influx of cold air and the avoidance of heat loss to the exterior; effecting economy of fuel, avoidance of damage from chilling drafts to furnace and insuring great efficiency, comfort and safety to the workmen.

Further particulars can be obtained from the manufacturer, E. J. Codd Company, Baltimore, Md.

DETROIT FUSE & MFG. CO. CHANGES NAME TO SQUARE D CO.

The Square D Company, manufacturer of electrical safety devices, Detroit, Mich., makes the following announcement:

"In view of the publicity already given our 'Square D' trade mark, and the fact that we have discontinued the manufacture of fuses, the corporate name of the company has been changed from the Detroit Fuse & Mfg. Co., to Square D Company." All future correspondence should be so addressed.

MARBLELOID FLOOR CONSTRUCTION

Marbleloid is a composition flooring suitable for large office buildings, industrial plants, schools, etc., and is also in use on war ships in the United States Navy. This material is laid in plastic form, usually one-half inch thick, over ordinary flooring construction, setting in a few hours in a seamless, tough body possessing a fine grain, smooth surface offering neither joints nor crevices for the accumulation of germs, dirt or moisture.

It possesses fire resistive qualities, is a non-conductor of heat and does not contract or expand under usual weather conditions. This material is made in various shades so as to conform with the color schemes of buildings. It is claimed to possess considerable durability and suitable for industrial plants, factories, power houses, etc. Rivets or screws may be driven into a Marbleloid floor for securing fixtures, machinery, etc.

Marbleloid Company, Marbridge building, New York City, will be pleased to send further particulars of this product on request.

"FIRE PROTECTION EQUIPMENT AND FIRE DEPARTMENT SUPPLIES"

The American-La France Fire Engine Company, Elmira, N. Y., has recently issued an illustrated booklet under the above title, comprising over 200 pages, illustrating and describing the various products and devices it is prepared to furnish in the Fire Prevention and Accident Prevention fields. This company is well known as a manufacturer of fire fighting and fire department equipment and also carries a line of safety first and first aid necessities.

This catalog, edition No. 5, may be had upon application to the above mentioned company.

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DAVISON NOW WITH AMERICAN ABRASIVE METALS CO.

Mr. Ralph C. Davison, for the past six years associated with the American Mason Safety Tread Co. in a selling and engineering capacity, has resigned his position and directorship with the above company to engage in a broader and more active field with the American Abrasive Metals Company, maker of Feralun Safety Treads and Anti-Slip surfaces. Mr. Davison, through his conection with the Concrete Association of America, has a large acquaintance among architects and contractors, and as Associate Editor of the *Railroad Gazette,* made many friends among railroad men.

NEW EXPLOSIVE SIGN REQUIRED BY THE GOVERNMENT

Since the passage of the Explosive Code, regulating the use and storage of explosives, quite a number of inquiries have been received regarding the proper sign specified by Section 16 of Bulletin No. 68. The Safety First Supply Company, of Pittsburgh, Pa., has placed on the market its sign known as No. 316, which has been manufactured especially to comply with the requirements of this law. These signs are 14 inches wide by 12½ inches in height, with red background and white letters, reading "Danger, Explosives, Keep Off," and giving the code and section number.

They are manufactured of five coats of porcelain enamel, fused at 2,000 degrees of heat. This makes them impervious to the action of acid fumes or of the weather, and they are guaranteed to be as bright and effective five years after posting as when first installed.

The screw holes are protected by a collar which eliminates danger of injury to the sign in posting.

These signs are much cheaper in the long run than the ordinary painted or lithographed tin sign which has to be renewed from time to time in order to be effective. This sign is more fully described in a pamphlet entitled "Legal Advice," copy of which will be mailed on application.

KING'S BULLETIN SERVICE

The Julius King Optical Company, 10-12 Maiden Lane, New York, or 7 West Madison street, Chicago, has been distributing each month, during the past year, an illustrated bulletin showing how eyes are saved in the industries through the wearing of proper eye protectors.

This company states that owing to the great number of requests received for these different bulletins. it has been decided to issue a folder reproducing ten of these eye protection bulletins, and will be pleased to send a copy on request.

NEW PULMOSAN FACE MASK

The Multi-Metal Separating Screen Company, 247 West 19th street, New York City, is announcing a new Pulmosan product, namely, the New Pulmosan Face Mask No. 20. This mask has been specially designed for the purpose of protecting the eyes, nose and throat of industrial workers who are compelled to work in irritating dusts and fumes. It is constructed of light metal, nickeled, and is comfortable and convenient to the worker, combining in a successful manner the functions of a respirator and goggles. The eye pieces of this mask are exceptionally large and insure good vision. Colored lenses can also be fitted where the work necessitates their use. The air is filtered through a fine sponge which can be charged with an antidote for fumes when necessary. The exhaled air is removed from the mask through an automatic valve. In the interior of the mask an important and valuable feature is a lateral fin fitted horizontally across the inside of the mask and cut to fit the nose. This fin performs the function of preventing the fogging of glasses by worker's breath. The parts of this mask may be quickly and easily removed when it becomes necessary to clean them or to replace any part becoming defective by long wear. Where a more complete protection for head, face and shoulders is required in combination with the use of this mask, a rubber cape of an airtight construction to fit over head and shoulders can be procured. The above mentioned company will be pleased to assist any manufacturer in installing respirator equipment of any kind.

Inasmuch as this company specializes in the manufacture of respirators and helmets to meet each particular requirement, the manufacturer who has met with an unusual situation in this respect may find his way out of difficulty by communicating with this company.

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STEELCRETE FLOOR SOCKETS

The Consolidated Expanded Metals Company, of Pittsburgh, Pa., manufacturer of the well known Steelcrete Mesh, has recently placed on the market an auxiliary feature to its line of wire machine guarding in its Steelcrete floor socket. In the construction of Steelcrete machine guards (which are so constructed as to enable their being made in any shop to fit any part of machinery) it has heretofore been necessary to split and bend the Safety Angle so as to form a base for the guards to rest on the floor. The new floor socket is strong, durable and practical. It is of rugged construction; is easily erected, and can be used on any kind of floor. The screw in the face of the socket permits the angle frame of the machine guard to be easily removed, but when the frame is in place the socket holds the guard perfectly rigid. Manufacturers using Steelcrete mesh to guard their machinery will find this new part most convenient and necessary. The manufacturer or the New York representative, the Expanded Metal Engineering Company, will be pleased to give full particulars regarding safeguarding appliances to all interested.

GENERAL SAFETY FIRST EQUIPMENT

The Safety Service & Supplies Company, of Chicago, Ill., has issued a most interesting illustrated booklet describing in detatil its large variety of safety appliances which should be of great interest to all manufacturers contemplating the purchase of such equipment. This company is prepared to supply manufacturers with practically every known appliance which will tend to safeguard life and property and increase the individual efficiency of industrial workers.

Industrial safety men and the manufacturers interested in accident prevention devices, first aid supplies, fire fighting and sanitary equipment, will receive this interesting catalog upon request to the above mentioned company.

DEATH OF J. A. McKEE OF THE MERCHANT & EVANS CO.

Josiah A. McKee, vice-president and treasurer of Merchant & Evans Company, died at his home in Philadelphia December 18, after a brief illness, aged 73 years. He was born in Columbus, Ga., but moved at an early age to Philadelphia, where he was long identified with the banking business, having been cashier of the Tradesmen's National Bank for many years prior to becoming treasurer of Merchant & Evans Company in 1896.

Mr. McKee was well known to the metal trade throughout the United States, and was foremost in every movement having for its object the betterment of trade conditions and the creating of a higher standard of business methods. For several years he was chairman of the Metal Branch of the National Hardware Association of the United States, and was also at one time president of the Philadelphia branch of the National Association of Credit Men. At the time of his death, Mr. McKee was also secretary and treasurer of the Globe Automatic Sprinkler Company, vice-president and treasurer of the Schuykill Railway Company, director of the Peoples National Fire Insurance Company.

He served in the highest sense both the public and private good of all with whom he came in contact. His death is deeply regretted and his memory will long be cherished. Mrs. McKee survives him with two sons and a daughter.

SAFETY SERVICE AND SUPPLIES COMPANY

The Safety Service & Supplies Company, 9003 Commercial avenue, Chicago, Ill., has issued an illustrated catalog, showing the various safety devices which this company supplies. This is one of the companies which have been organized for the purpose of supplying a number of different devices needed in industrial safety campaigns.

Copy of the catalog will be sent by writing to the above mentioned concern.

INDUSTRIAL SAFETY AND WARNING SIGNS

The value of safety and warning signs has now been well demonstrated in preventing industrial accidents. Experienced safety engineers now acknowledge that safety and warning signs, judiciously used, are a considerable help in industrial safety campaigns.

The Abbot Enamel Sign Company, 25 East 26th street, New York City, is a manufacturer of signs needed in industrial safety campaigns and maintains a wide assortment of various

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signs for use in a number of different languages. Illustrations are shown herewith of those of the more popular signs which this company manufactures.

An enlarged illustrated catalog is now being prepared by the Abbot Enamel Sign Co., copy of which will be sent to industrial men on request.

SAFE AND SANITARY WORKMEN'S QUARTERS

The C. D. Pruden Company, 56 Pine street, New York, and Baltimore, is placing on the market its Prudential Steel Houses for industrial plants which should be of interest to all large manufacturers, railroads or contractors. These houses are fire resistive and sanitary, sturdy and simple in construction and afford ideal living quarters for industrial workers. Much inconvenience to contractors, mining men, railroad and construction men has been caused by their inability to secure at short notice convenient quarters for the workers of their construction gangs which would be of fire resistive and sanitary construction and which could be transported as the work progressed. In addition to this, sanitary and comfortable living quarters will materially increase the individual workman's efficiency.

The above mentioned company will be pleased to submit full particulars to those interested in these houses.

PREVENTING ELEVATOR ACCIDENTS

The safety of freight elevators is a subject which comes within the province of every industrial employer and an unguarded elevator is a distinct hazard. A freight elevator which can be moved from one floor to another in the absence of the regular operator has caused a great many accidents due to an inexperienced person starting the elevator and not knowing how to operate it. Another cause of danger is when an elevator is being loaded at one floor and a man two or three floors above or below suddenly starts the elevator without warning and without thinking or inquiring whether it is safe to start it. There is only one way to prevent such accidents, and that is having a reliable, efficient safety stop on the elevator which will prevent it being moved except by the operator of the elevator.

The Angell Elevator Lock Co., Boston, Mass., has specialized in elevator safety stops and locks for many years, and has installed thousands of Angell elevator safety floor stops and locks on elevators in industrial buildings. Not only does this safety stop prevent the elevator from being operated from any other floor except where the elevator is, but the operator can lock the elevator and so prevent it being moved until he returns.

UNBREAKABLE SHAFT HANGERS

The Standard Pressed Steel Co., Philadelphia, calls attention to the advantages of the unbreakable steel hanger which withstands sudden and violent shock without breaking. This is something which users of hangers should consider. Should a hanger break and thereby suddenly liberate heavy machinery over head on men working beneath, undoubtedly a serious or fatal accident would result. Iron has not the resistance to shock and violent strain that steel possesses and it would seem a steel hanger is more in accordance with safety practice than iron.

WIRE GLASS FOR WITHSTANDING SHOCK

Heretofore the chief use of wire glass has been as a fire retardant, and wire glass windows are now universally used as a means of fire protection. A hazard which has grown alarmingly in this country during the last year or two is the explosion hazard and many explosions have occurred which have shattered ordinary glass windows and thereby inflicting severe injuries on people from the flying and falling glass.

In these explosions where wire glass was in use, in many cases the wire glass held and thereby prevented people in the vicinity of the building from being injured. A notable instance of this was in a large building in the explosion zone of the Black Tom Island explosion which had both ordinary and wire glass windows. The ordinary glass windows were entirely shattered, where the wire glass windows in the same building withstood the shock. In large industrial plants where a great number of people are employed the advisability of installing wire glass windows should receive prompt consideration. Explosions, like fires, can never be foretold, and great injury and loss of life to numbers of people can easily occur where all the windows in a large industrial plant are suddenly shattered by an explosion. Wire glass windows furnish the safest protection against this hazard.

The Mississippi Wire Glass Co., 200 Fifth Ave., New York City, manufactures wire glass for all purposes and will be pleased to give particulars to any one interested in wire glass.

FIRE ALARM GONGS

The Union Water Meter Co., Worcester, Mass., is the manufacturer of a steam gong which is being extensively used as a fire alarm. This 12 inch, three bell steam gong possesses great power producing a very large volume of sound which extends over a very large range. This steam gong should not be confused with an ordinary steam whistle, which usually emits a softer sound. The steam gong's warning extends over a large range. This steam gong is recommended for use in large industrial plants, because it will be distinctly heard above the incessant noise which is a part of busy industrial establishments.

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THE EDISON ELECTRIC SAFETY MINE LAMP

About 100 years ago, Sir Humphrey Davy gave to the world the principles of his safety lamp which up to today underlie the construction of practically all safety oil lamps. Before the feasibility of working the lower levels in coal mines was considered, candles or oil torches of primitive type were in general use. Even emery wheels revolving against a flinty substance was sometimes taken for illumination, throwing against the working face the feeble light obtained from the shower of sparks. This served their purpose until the deeper mine workings were reached and the presence of inflammable explosive gases produced a danger with which the mine officials were powerless to cope. The Davy Lamp was offered as a relief and accepted by the English Government.

The later history of mine lighting is one long series of experiments in improving the Davy Lamp. The Edison Portable Battery and Electric Cap Lamp for mining purposes is a crowning achievement in mine lighting. The greatest danger in mines today is from the use of unprotected flames wherever the deadly fire damp is likely to be encountered. Explosions resulting from open lights not only cause the immediate death of the miners in the vicinity and the subsequent suffocation of the survivors by the fumes which follow, but originate conflagrations in both gaseous and non-gaseous mines.

The annals of mining are overcrowded with accounts of financial losses and destruction of life due to the secondary disasters for which the miner's torch has been responsible. In using the Edison Electric Safety Mine Lamp, the miner straps a battery case to his back by his ordinary belt. The lamp is attached to the leather support in his cap leaving his arms entirely free of lamp, cord and battery case. When the case is locked and the lamp handed to the miner charged and "burning" there can be no safer or surer means of illumination.

CORRUGATED WIRE GLASS AND ASBESTOS SHEATHING SKY-LIGHTS

The Keasbey & Mattison Co., Ambler, Pa., well known manufacturer of asbestos products is now marketing corrugated glass to be used for skylights in conjunction with Ambler Corrugated Asbestos roofing and sheathing. This corrugated wire glass, it is claimed, nests perfectly with the corrugated asbestos which will produce a non-leakable and fireproof skylight, saving the high cost of frames and flash necessary in present styles of roof skylights.

This constitutes a new departure in fire resistive skylight construction. Full particulars can be obtained from the above mentioned manufacturer.

SANITARY DRINKING FOUNTAINS

At last employers are recognizing the importance of furnishing drinking water to their employes which is not contaminated with disease germs. In abandoning the drinking cup, a great step forward was made in safeguarding against the danger of contracting diseases from the drinking cup but the next step was to furnish drinking water which at all times would be safe.

The sanitary drinking fountain was introduced to meet this requirement. The Glauber Brass Mfg. Co., Cleveland, Ohio, went into the proposition of designing a bubbling fountain which would meet the demands of sanitation and practical service such as exist in industrial plants. This concern has devoted its best energies to the production of the Glauber Sanitary Drinking Fountain and is now supplying sanitary drinking fountains to a large number of industrial concerns. Those desiring further information on this important and necessary means of protecting life and health, should communicate with the above mentioned manufacturer.

SUCCESSFUL FIRE FIGHTING

Experienced fire fighters maintain that to extinguish a fire as quickly as possibly, solid, powerful streams of water are absolutely necessary. There is no question but what a considerable proportion of our huge fire loss can be attributed to lack of efficient fire fighting apparatus.

The Samuel East Co., Concord, N. H., has specialized for many years in manufacturing holders, nozzles, and deluge sets which furnish the full value of fire fighting facilities. Eastman nozzles and deluge sets produce solid, powerful streams of water which carry longer distances than ordinary apparatus. This equipment is especially adapted for use with motor apparatus. The Eastman Co. claims that its deluge set streams carry from a 50 to 100 feet greater distance from the same pressure than ordinary streams. As large fires are liable to occur at any time every fire fighter should be sure that there is ready for instant use large powerful streams of water.

BARRETT SPECIFICATION ROOFS

The Barrett Company, 17 Battery Place, New York, reports that the demand for Barrett Specification Roofs during the past year showed a notable increase, which indicates that the importance of high quality, dependable roofings is being appreciated more and more. A feature of the Barrett Specification Roof is the amount of protective waterproofing material used in its construction. On the top of the waterproof material is laid a wearing-surface of gravel, slag, tile or vitrified brick. On these roofs the wearing surface is slag.

The Barrett Company for some years has given a surety bond with their specification roofs which guarantees them for 20 years.

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SAFETY ENGINEERING

VOL. 35 FEBRUARY, 1918 No. 2

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"THE MAN OF THE HOUR"

The American Soldier of Industry Must Win the World War

There is a real danger that in our sympathetic and proper thought for the Soldier in the Field, we may lose sight of the Soldier in the Factory, who has his casualty risks as well as his brother in arms.—*Secretary Redfield.*

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Which Shall It Be, Guards or Education?

A Conversation for SAFETY ENGINEERING *by Robert A. Shaw, Safety Engineer, Ford Motor Company, Detroit; E. F. Lingemann, Supervisor of Labor, Hudson Motor Car Company, Detroit, and M. E. Arkills, Safety Engineer, The Pullman Company, Pullman, Ill.*

MR. SHAW: Recently, while discussing safety problems with a representative of another concern, he quite surprised me by asking, "Which Shall It Be—Guards or Education?" I was surprised, because to me the answer has long been clear—neither stands first: the two are inseparable. Each is included in the other. Without the one the other would be of little or no effect. So I told my safety friend what I thought, and then explained how and why I had arrived at my conclusion.

The safety problem is complex at best and, to the beginner especially, it seems almost unsolvable for a time. The first impulse is to depend largely upon the educational side, so-called. Bulletin boards, occasional talks, a shop paper, perhaps, are believed sufficient. Guards cost money, their installation is slow and difficult, the antagonism of foremen and machine operators may be aroused—and production may be interfered with. Therefore, the beginner decides on what seems the simplest course.

But two errors of judgment develop right here. One is that a campaign of education is an extremely difficult thing to handle. There is nothing definite or positive about it—no way can be found of knowing what is proving effective and what is a waste of time and money. The men are apt to be skeptical and look upon "Safety First" more as a joke than anything with possibilities for good. The other is that the men in the shop will not co-operate in the movement unless they see tangible proof that the company is expending both money and efforts to protect them.

This being true, it seems that the effective way to get results is first to convince the men that the company is dead in earnest and is really doing all possible to positively prevent its employes from being injured. Mechanical guarding is the one thing that will accomplish this end. Once the firm's interest in the movement has been made clear to the men it is time to enlist their support. It is then that they will look upon the shop bulletins with a receptive mind and they will listen to safety talks, read safety publications and attend safety motion picture shows willingly and whole-heartedly.

With the plant safeguarded in a mechanical way, a very considerable reduction in the accident total is practically certain. Here the beginner in safety work receives his first encouragement. With this advancement come others in natural sequence. One of the most important of these is thoughtfulness on the part of the employes—including the foremen. The idea of being safe appeals strongly to them. The idea is father to the act. Soon the men, of their own accord, devise ways of working in safety. They adopt safe methods. Instead of doing things in a bungling, haphazard manner, they use judgment—they think. Annoying little accidents, as well as many more serious, that formerly were all too frequent, now disappear as if by magic, but there are already three good reasons established—well guarded machines, thoughtful workmen and proper methods.

Soon another feature appears. The men, enthused over the success of the campaign being waged in their own interests, apply their own inventive ability and suggest many ways of preventing accidents. In our own plant many of our most successful devices have been worked out by our men. In many instances they have seen places where they, themselves, could be injured, and so it was perfectly natural that they should think out means of protecting their own fingers or toes or whatever part of their person may have been in danger. We like to have our men take this attitude, and we encourage

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it. We have pointed out frequently to them that what we must have in our plant is a safety organization in which every employe is not only a charter member, but a vitally active member.

It is true that authorities say less than half of all accidents can be guarded against positively, and we therefore naturally conclude that over half of our work must be educational. In this I agree, but I still insist that after all the educational phase is but an auxiliary or "follow-up" to the mechanical side. We have bent our efforts largely in our factory to the guarding of machinery and hazardous places. We now have this work well in hand, I believe, and so are laying more stress upon the other side. Bulletin boards are used sparingly and only in departments where we feel they will be of particular interest. A monthly book, with plenty of cuts, tells the safety story to our men simply and as interestingly as we know how to make it. We show our men where accidents have happened, how they happened, and how they could have been prevented.

Following out the same idea, but presenting it much more graphically and, therefore, effectively, our safety films are in daily use. These quickly carry our men on an imaginary trip through the plant where they are shown the many different types of machines, being operated in safety. Often the guards are removed and the men clearly see the dangers to which they were once exposed every day. The folly of wrong methods, carelessness and lack of interest is pointed out. The men grasp the teachings of the films quickly and with open minds, for the lesson is obvious.

Educational work in our factory has not been carried on extensively for much more than a year. Figures now available, covering the one year period, are therefore significant. For instance, I note that in Febfuary, 1916, with approximately 30,000 employes in our main plant, there was an average of 3.9 lost time accidents per 1,000 men that month. One year later, in February, 1917, with somewhat more than 40,000 men, we had 2.1 accidents per 1,000 men, or a reduction of 1.8 accidents per 1,000 men during the year.

As with fires, the place to prevent accidents is at the source. Hence, our educational campaign has been extended to the purchasing department, which has charge of ordering our machinery, and to the drawing room where guards and many other kinds of equipment are designed. Standards for the shop are thus established and equipment is made safe before it is installed.

I have sometimes heard it said that factory superintendents were hard men to keep interested in safety, but I have not found it so. In approaching the superintendents I have made it a point to have my plan well worked out first. I have its feasibility clearly in mind, and am able to give the approximate cost of my contemplated change. Then I have little trouble securing an O. K.

Objections will be few from the "higher-ups" if safety devices and regulations are not a hindrance to production, and there is no need that they should be. In some cases we have actually found that our safety equipment increases production and that, at times, we are able to make our rules for safety increase efficiency as well.

Which Shall It Be—Guards or Education? I feel confident that the answer is clear. Without one the other cannot succeed. That has been my experience, and I am sure that all other safety men have arrived at the same conclusion after bucking up against the safety problem for the same length of time.

MR. LINGEMANN: Which Shall It Be—Guards or Education? This question I suppose is asked a number of times. To me it is neither guards nor education. It is the co-operation of the two. Without one the other would be a hopeless task. I will try to tell you why I make this claim.

The safety problem or campaign, to get it started or introduced into a plant, is a very hard and complicated task, especially to the beginners. They include laborers, mechanics and foremen. The first thing to do is to get all machines and hazardous places guarded. Men and foremen do not like the idea of guards as they often interfere with production. The operator becomes an-

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tagonistic about guards for they interfere with his work and he may not be able to turn out as much work as he wants to.

The educational campaign is a very difficult task. Bulletin boards, shop booklets, safety rules and literature, always placed before the men, are put there with considerable cost. Eventually one will be able to see returns coming in, such as suggestions from the men, which I think is good proof that something is being accomplished.

Beginners for a time will treat "Safety First" as a joke. They will not use guards nor take precautions. But when they find out that the company is backing the safety committee their attitude will change very quickly. They then come to the conclusion that "Safety First" means their own protection as well as that of others.

Thus the first thing to do is to impress the beginner with the understanding that the plant is a "Safety First" plant; that if he accepts employment with the company he must try to be as careful as possible; that he must try to protect his fellow employe as well as himself. With that in mind the men will take to the educational part very rapidly, such as bulletin boards, shop booklets, safety films, etc.

With the plant well safeguarded, which is by all means the first step to take, one is bound to decrease the accidents 40 per cent. If that is brought to the attention of the workmen, they soon begin to realize that some gain is being made by the campaign. They will take even more interest by sending in safety suggestions or designs for guards. Serious accidents as well as trivial accidents will gradually be reduced as the safety organization works together—man for man as his brother's keeper. The thoughts of an efficient workman, working on a well guarded machine, are on safety and the right way to do his work. He is producing the goods.

An old saying of safety men is that one-half of the accidents are avoidable. I quite agree with them that one-half are either due to carelessness on the company's part or to the carelessness of an employe. If it is the fault of the company the plant is not safely equipped. If it is the fault of the man, the educational part has not been worked out properly.

We have this well in hand in our plant. The safety committee makes a thorough inspection each month. Bulletins are used throughout the plant. Shop rules are given to each employe. A shop paper is published each month with cuts showing the right and wrong ways to do things and how to prevent accidents.

The safety campaign in our factory was introduced about 18 months ago and I can safety say that our accidents have decreased some 35 to 40 per cent. I cannot give you the exact percentage on account of adding new departments. During the time we have almost doubled the working force.

Which shall it be—Guards or Education. I can safely say that the question is answered. A safety campaign without both cannot exist. I hope my opinion will coincide with the opinions of other safety men who have been in the game a considerable length of time.

MR. ARKILLS: My eight years of experience in safety work tell me that Guards and Education are absolutely inseparable, so far as the wellbeing of the safety movement is concerned.

Since the acts of an individual are based upon the knowledge he has or the consciousness which he possesses the value of guarding the things tangible to his sight is of first importance. To a great extent the average man's knowledge is made up of concepts gleaned from the evidence furnished by the five senses. Therefore the things which he sees, hears, tastes, feels and smells, are the things he knows most about, and it is by some one or all of these avenues that he must be approached, and made a safety "fan." As sight is perhaps the most important one of the senses, the average individual will probably be more impressed with the things he sees done for his safety in the shops, than by any other of the five senses.

For this reason guarding of machines furnishes to him the tangible evidence

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of sincerity on the part of the company for which he is working. The next great boost that he can get along this line is by actually using a guarded machine, experiencing the added security from hazard that is to be experienced by the man who operates a well guarded machine.

The guarding of a machine is the following of the great truth from the standpoint of right and wrong. It is, therefore, a step—even though material—toward the right mental conditions on the part of each employe. This naturally paves the way for another mental step, even higher, which may be the more easily accomplished by means of the bulletin board, moving pictures and literature, more especially on the part of our foreign brother, who does not speak nor read our English language. To have series of pictures which tell a story, is very helpful.

As the means of physical guarding and education go on from year to year the employe who stays long with the company, is capable of the higher mental attributes such as carefulness, care for his brother workmen, and therefore his home. All of these are conducive to right actions on his part at all times, which means freedom from accidents, so far as this type of man is concerned.

So, with those preceding me, I am forced to say that guards *and* education are the means to safety—not guards *or* education.

MR. SHAW: The verdict seems to be unanimous in favor of combining the two departments of safety work—guarding and educational efforts. It also appears that all are agreed that if employes are to be interested in safety work they must first be shown conclusively that their employers are willing and anxious to go the limit to provide safe equipment and proper working conditions.

Guarding of equipment should not hinder the operators and it need not, for in 90 per cent of the cases foremen and employes will be glad to co-operate in working out means of making their equipment safe.

I agree with Mr. Lingemann that, if your plant is known outside and inside as a "Safety First" plant, the newcomer and the "old-timer" alike will enter into the spirit of safety work and help immeasurably to bring about really safe conditions. I also agree with Mr. Arkills that special efforts must be made to reach the employe who does not understand English. In this connection I might say that from my own experience in our plant I cannot recommend too highly the adoption of some definite plan for teaching these men the English language. Such a plan costs money, of course, but it goes right to the root of the evil and repays its first cost many times over and from many different points of view.

After all then, the question should not be, "*Which* shall it be?" for we surely are fully persuaded that we must have both—first the guards to satisfy the men that the employer means business and then the educational work, enlisting the active co-operation of all. Then our efforts will bear fruit and we may well feel that we have made a fair start toward banishing accidents, suffering and death from American industry, for all time to come.

(Issued by The Safety Department of the Doherty Organization, New York.)

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Fisk Rubber Company's Organization for Safety

By H. T. Martin

Manager of the Health Department of the Company

An Address Before the Hampden County Safety Council, Branch of the New England Safety Council, January, 1918

THE Fisk Rubber Company employs normally about 5,000 in the factory and 550 in the office. The Health Department is responsible for safety, sanitation and hospital.

NEED OF ORGANIZED SAFETY WORK

Familiarity with hospital records from which valuable data have been secured made it very clear to this department some time ago that accidents were costing this company an immense amount of money in the loss of production and payment of compensation. Furthermore, it was noted that practically all of the accidents were due to carelessness.

HOW WE ORGANIZED

The remedy suggesting itself was organized safety work, including an educational campaign. First, however, it was necessary to impress this upon the management. This was done successfully and on July 6, 1917, the company decided upon a definite policy for accident prevention and a General Safety Committee was formed, composed of:

Factory Manager, Chairman,
Assistant Treasurer,
Superintendent of Production,
Superintendent of Power, Maintenance & Engineering.
Health Department, Director.

The responsibility for operation was placed upon the Health Department.

It was impossible to hold another meeting until October 5, 1917. Perhaps the most important item at this meeting was the decision of the factory manager to talk to men in the factory organization at subsequent meetings, relative to new policy regarding accidents.

Immediately there followed a series of safety committee meetings, at which were present the department heads, assistant superintendents, general foremen, sub-foremen, and shift foremen, numbering approximately 125 men.

These men were informed by the factory manager in his capacity as chairman of the committee that we were having too many accidents and that they must be reduced or someone would be looking for a new job.

He placed the responsibility directly on the foreman's shoulders, stating that the company had been at fault for not treating the matter more seriously in the past. He impressed upon them the fact that in the future increases in salary would depend as much upon a man's accident record as his production record.

These men were told that the company would do all mechanical safeguarding necessary to make the plant safe and that they must educate themselves and men under their charge to avoid accidents.

The proper education of the new man, as to safe way to do his job, the insistence upon safe practices and the constant watchfulness necessary to keep accidents at a minimum, were other items mentioned.

At the close of these meetings the entire factory organization was familiar with the company's new policy.

This, to my mind, is the only way to effectively start a safety campaign. First of all, the management must seriously appreciate the importance of it and I am happy to say that our management does, and this same realization then is easily carried down the line, even to the most humble sweeper, who

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knows that the big boss is strong for safety and naturally falls in line.

The safety committee planned to meet weekly to discuss matters of policy and after the executive session to call three different foremen at each meeting for discussion of conditions in their departments.

It having been previously decided not to use workmen's committees for safety inspections, as used by many other concerns, our substitute is the appointment of three men from the factory organization at each meeting who are required to inspect a department and report in writing at the next regular meeting. These men are not informed as to the department to be inspected until they are about to make their inspection. This prevents the foreman of the department in question from preparing for their visit. Their reports are investigated by the safety committee, then all parties concerned are brought together and disposition is made of the several items reported.

Orders are placed for safeguards wherever necessary and the items which are matters of discipline are put up to the foreman for correction.

Three departments have already been inspected and results have shown fine co-operation and serious thought. We aim to give no one a chance to get back at the other fellow by careful appointment of men to committees.

SAFETY INSPECTOR

A safety inspector who is a mechanical engineer has been added to the health department, and devotes his entire time to accident prevention work.

SAFETY BULLETIN BOARDS

Safety bulletin boards have been placed about the factory upon which we will post National Safety Council bulletins, of which society we have been a member for two years past. Permit me to state the Council has been of great service to us. We will also post some of our own bulletins, photographs, blue prints, sketches, etc.

SAFETY SUGGESTION BOXES

Safety suggestion boxes have been placed about the factory. We are giving these a 60 day trial without awards. In the first collection, a week after installation, we received eight suggestions, each a bona-fide safety suggestion. Acknowledgment of the receipt of these suggestions was made by personal letter. Final results of action taken will be conveyed to the person making suggestion in same manner or by personal contact. We are using common ordinary house mail boxes and no forms are provided.

SAFETY AND HEALTH BULLETINS

A bulletin, previously issued as a health bulletin, has been converted into a Health and Safety Bulletin and the contents are devoted to safety, on the first of each month.

NEWSPAPER

We are fortunate in having a factory newspaper. This we use to advantage, utilizing some space each week for safety.

PAY ENVELOPES

Safety slogans will appear on pay envelopes in the future.

UNIVERSAL DANGER SIGN

The Universal Danger Sign has been adopted and appears in many places about our factory. Several notices and articles have been published to acquaint the employes with its meaning. We are having made several portable signs to be used by the maintenance department.

SAFETY AISLES

Safety aisles have been laid out and the danger sign is being used in connection with them.

DEFECTIVE EQUIPMENT TAGS

Defective equipment tags are used on dangerous pieces of equipment which must not be removed until same has been repaired.

BOOKLET OF INFORMATION TO EMPLOYES

A booklet of information for employes is in the hands of the printer. This is vest pocket size and contains

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interesting information for both the old and new employes, as well as general safety rules. We feel this will be more beneficial than the ponderous safety rule book used by some. Our first intention was to issue a book of this sort, containing general safety rules and departmental rules. After much talk, we decided that a man would only be interested in the rules for his own department and finally it was thought better to place these rules in his department in some manner in order that they would be before him at all times whereas the rule book would get one glance and perhaps not that.

FOREMEN'S ACCIDENT REPORT

We require a foreman's report on each accident. These are checked up with the accident slips made out in the hospital and insure the correct story and guard against the payment of compensation to anyone not entitled to it. It also brings every accident to the attention of the foreman. The investigation of the accident by the safety inspector again brings it home to the foreman, thereby constantly reminding him of the fact that we are after his accidents.

DEPARTMENTAL SAFETY MEETINGS

It is proposed at an early date to hold departmental safety meetings, at which the foremen will gather their subordinates and talk on conditions existing, receiving from the health department such figures as they may require.

RESULTS

We consider that our safety work started immediately at the completion of the factory manager's talks to executives, therefore, November, 1917, was the first month of organized safety work and we reduced our total accidents 22 6/10 per cent, our accidents causing loss of one day or more 21 4/10 per cent, during this month. Our December reduction figures were 45 1/10 per cent in total accidents, 61 2/10 per cent in lost time accidents. These December figures are unfair, however, as we were closed two weeks for inventory.

GENERAL

The maintenance of factory hospital, sub-station hospital and infirmary, provides for proper care of accidents and we insist on men coming to the hospital even for the slightest scratch. We also insist that they come back for redressings.

A visiting nurse is employed to treat patients in their homes. She also does a little detective work which is necessary to get some of our injured people back to work.

The hospitals have passed through the stage of suspicion as evidenced by the fact that during the year 1917—32,750 employes were treated for sickness, accident and redressing.

Two doctors, two male nurses, and three female nurses cover the 24 hours the factory is in operation. A Polish interpreter acts as hospital clerk and she has been of great value to us in getting correct information from our Polish people in regard to their accidents.

CONCLUSION

Our figures for November and December have shown a reduction. We do not hope to show as high a reduction consistently throughout the year 1918 but we are quite positive that we have started in the right direction and if persistency in education and installation of mechanical safeguards will reduce accidents we are bound to show some very gratifying results this year.

DRINK at least six glasses of water a day in winter and eight in summer. This means a glass on arising, one at each meal, one or two between meals and one at bedtime. It is not harmful, as some think, to drink water with your meals, provided food is not washed down with the water. See that no food is in your mouth when you drink and no harm will result.

Before breakfast drink a glass of hot water. During the day drink cool water. Avoid iced water, if possible. Do not use a "common" drinking cup—carry a folding cup if a "bubbler" is not provided.

(Prepared and Issued under the Auspices of the Health Service Section, National Safety Council.)

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The Inclosing of Current-Carrying Parts of Electrical Devices

By Hubert S. Wynkoop, M. E.

Electrical Engineer, Dept. of Water Supply, Gas and Electricity, City of New York

IT is doubtful if there is to be found today in the electrical industry anyone who will deny that the inclosing of live metal parts of switches, receptacles, rosettes, fuse blocks, etc., is an eminently desirable thing. Some there are, however, who are not ready to subscribe to the assertion that the operator should be protected against himself through a redesigning of inclosed appliances in such a manner that he can operate them without coming into contact with live metal.

Almost from the beginning we have had with us an inclosed snap switch. But beside it was—and is—the open knife switch. We have been at considerable pains to inclose the little metal while leaving exposed the greater mass. Daily, for at least 20 years, there has gone forth from one or more inspection offices the following violation notice: "Cap of snap switch missing." At how much longer intervals have we written: "Knife switch not inclosed"? We have required what was easy and cheap of accomplishment and have disregarded the relatively difficult and expensive.

The snap switch protects both public and operator. The open knife switch protects neither. Where we deem protection required we place the knife switch in a box and protect the public; *but we do not protect the operator.*

And this is true also of fuse blocks.

Electrical shocks and burns are so easily preventable in the majority of cases that the wonder is we have so long deferred the obvious requirement of inclosing all live parts. The wonder grows when it becomes understood that safety-to-life precautions do not in any way decrease the facility of operation of electrical devices. An added clumsiness is, I understand, the argument advanced against the application of guards to many kinds of machines.

The writer here sets down the various reasons which occur to him as explanatory of the situation which confronts us. They are as follows:

1. *Inertia of the inspection mind.*—The National Electrical Code has enjoyed such widespread acceptance that a justifiable conservativeness furnishes some of this inertia. Besides, it is not altogether clear that this code can attempt to legislate in matters of accident; although it seems to have done so most successfully in the case of the snap switch. However, the Safety-to-Life Code will probably supplement the National Electrical Code when the former has become generally adopted.

2. *Reluctance to increase the cost of electrical installation.*—The contractors and the central stations are entitled to consideration. Safety knife switches and safety fuse blocks will undoubtedly raise the cost of installation. Is this increase of cost absolutely necessary? The answer will depend upon the time of asking the question—yesterday, "no," today, "probably," tomorrow, "assuredly." So, while the day of the safety switch may not have arrived, it is fast approaching.

3. *Reluctance to upset manufacturing, especially at the present time.*—It may seem a small matter to add a new requirement to a set of rules. The inspector will say that no great embarrassment will be caused because his office does not make rules retroactive and that the contractor can always buy the right kind of appliances for his *new* jobs. But who will make these appliances? What is to become of the thousands of appliances rendered out of date by their successors, and of the patterns and dies and other manufacturing accessories?

4. *Anticipated embarrassment in enforcing the new requirement.*—It is going to be a little difficult, I think, to explain to the satisfaction of a small

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manufacturer who has been using an open knife switch for the past ten years that his additional motor must have a safety switch, although the old motor may still run along with the open switch during the good behavior of the latter.

5. *A conservative desire to gain more experience in the enforcement of the new Safety-to-Life Code, and in the application of the forthcoming grounding rule of the 1918 edition of the National Electrical Code.*—At the present time we may see our way clear to phrasing a new requirement relating to knife switches and perhaps also to fuse blocks, but there are other live metal parts which should be guarded, and, until we learn which of these are to remain ungrounded, we cannot make specific provision for them.

It is the writer's belief that the inclosure of all live parts of devices cannot be brought about all at once and that the burden of responsibility rests upon the municipal inspection services. These operate either under promulgated rules or under specific ordinances. The rules or ordinances are at present based upon the requirements of the National Electrical Code. The logical procedure is to graft upon these rules or ordinances the essentials of the Safety-to-Life Code —much or little at a time, as local conditions may determine.

We need not wait much longer before beginning with the knife switch and the fuse block, for the manufacturers are getting into line, the central stations and the contractors are acquiescent and the welfare workers and the casualty underwriters are eager.

Training New Men in War Industries

THE Bureau of Employment of the State of New York, remarks that the United States is confronted with the need in the next few months for a great number of workers to do the technical work coming into existence through the needs of the war. Industry in this country has not heretofore called for such a high number of technically trained men. To solve this need it will be necessary for employers to get together and decide on the number of workers each one should train to supply this coming need. This should be done in each industrial community through the co-operation of employers needing any kind of technically trained men. The United States is just now teaching thousands of men how to shoot a gun and handle a bayonet. Is it not just as desirable to teach men in this emergency how to handle a tool and a machine? Many thousands of soldiers are at this time just as unfamiliar with the rifle and the bayonet as are thousands of workers with the tool and the machine. We have great numbers of men available for the training. Let us train these now and later absorb them into the industries needing them before we consider the use of large numbers of untrained women.

There is a difference of opinion as to the most practical and speedy method of training large numbers of technical workers. Many are in favor of having it done in the plant, but before this can be accomplished, the attitude of most superintendents and foremen of departments will have to be changed. It is found that in the majority of cases, foremen and superintendents look very much askance at taking on a man for training directly in the workshop or plant. These foremen will have to be brought to realize that we are in an emergent situation and that old methods must give way to new ones to meet present conditions. As an example of training possibilities, take ship fitters, who are now much in demand. Any good house carpenter can, in a very short time, be made a ship carpenter, and any efficient ship carpenter can be rapidly trained for the work of ship fitter. There are plenty of good house carpenters, but very few ship carpenters or ship fitters. This example can be paralleled in many other lines of industry.

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Five Men in the Shops Behind Every Man in the Trenches

By David M. Allan

Inspector, Accident and Liability Department, Aetna Life Insurance Company, Albany, N. Y.

Address Before Employes of a Plant Employing 250 Men in Machine Shop and Foundry

YOU, no doubt, have been addressed by representatives seeking aid for our boys "Over There" and in our home training camps. Also it is brought to your attention daily that it is vitally necessary to conserve our food products—that it is important for us to sacrifice numerous luxuries in which we were wont to indulge and to use the money which we might spend in extravagance, in assisting our government in every way possible. Being red-blooded loyal Americans we all have resolved to "do our bit." We who are beyond the age limit of army usefulness, who have dependents or for other reasons do not qualify for service at the front, have been left to keep the wheels of industry in motion, which is just as important for the carrying on of the war as is the mobilization of soldiers. There are 21 countries at war, 31,000,000 men engaged, 6,000,000 prisoners, 5,000,000 in hospitals.

It is estimated that it is necessary to have five men in the shops for every man in the trenches, therefore, it is our duty as shop workers, or we might say, members of the industrial army, to stand back of our military forces lending our best efforts toward their support. We must be equally vigilant about keeping our lines strong as are those at the front. We must conserve our man power and how best to conserve it is the subject on which I have been asked to talk to you men today.

It might be interesting for you to know that there are over 12,000,000 people killed or injured in the United States each year, 32,000 each day, and 22 every minute. One person is killed every minute.

More than 2,000,000 are killed or injured in industry each year, 1 person is injured every 15 seconds.

During 1916, 22,000 persons were killed and 500,000 so seriously injured that they lost more than 4 weeks from work. This is almost as many as are killed and maimed at the front.

The record for New York State covering a period of three years:

	Accidents	Comp. Paid	Doctors' Fees
1914	225,000	$6,400,000	$2,475,000
1915	279,000	8,000,000	2,970,000
1916	313,000	9,360,000	3,443,000
	817,000	$23,760,000	$8,888,000

There were 1,500 fatal accidents.

You may have in mind that fatal accidents and injuries are unavoidable in industry, but statistics show us that from 70 to 75 per cent of the accidents are avoidable and are due to the careless chance-taking of the workers. For a more concrete case let us consider the accident record of your own plant covering a period of 11 months, during which time 56 accidents occurred, 22 being eye injuries, almost 40 per cent of the total.

As these injuries occurred while you men were chipping or grinding, it is reasonable to suppose that all of them could have been avoided by the use of goggles. By goggles I mean a strong-rimmed, specially constructed, safety-type eye protector with which, no doubt, the majority of you are familiar and the use of which cannot be too strongly impressed upon the mind of those who do chipping or grinding or babbitting. You should realize that your company has furnished the goggles for your protection and all it asks of you is that you wear them while

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performing work from which flying particles may injure your eyes. When we say *wear* the goggles we mean to wear them over the eyes and not upon your forehead or under your cap as I have seen a number of men do. As the eye is a very sensitive and delicate part of the body it is essential that we guard it with the utmost care. We should not allow any person to attempt to extract foreign matter from the eye except the person in charge of the first aid kit or a physician. That oft-used dirty handkerchief, toothpick, knife-blade, etc., in the hands of your co-worker should be shunned as you would avoid a loaded revolver in the hands of a maniac.

Very serious have been the results of the experiments of these so-called "handy" eye-men, who volunteer their services with the best of intentions. Two of these amateur jobs with bad results have been witnessed by the speaker. In one case the "shop eye-doctor" used a sharp blade of a knife to remove some foreign matter and in prodding around the victim's eye, something went wrong. Result—the man is now working along with one eye. The sharp blade of the knife penetrated the delicate tissue of the eye-ball and the sight ran out. We have numerous cases of infection of the eye as the result of dirty kerchiefs and matches, toothpicks, etc.

SLIGHT INJURIES

In this connection, gentlemen, let me impress upon you the absolute necessity of giving attention to slight abrasions of the skin, scratches, small cuts, slight scrapes and bruises. No injury, no matter how slight, is too small for attention. You have in your plant a well stocked first-aid kit and a competent man in charge of it who is ready to dress any and all of your wounds. The results of infection of small scratches and cuts are horrible to look at and the accompanying sufferings are almost unbearable. It is absolutely necessary for your own welfare that you care for the seemingly inconsequential scratch before it becomes a job for the surgeon.

It is necessary for you to report all injuries which you may receive to your foreman. To illustrate the necessity for reporting all injuries: I attended the New York State Safety Congress a short time ago and during one of the sessions, one of the commissioners stated that every day workmen file claims for lost time which cannot be granted for reason that the filing of the claim was the first notice that had been given that the claimant had been injured. In failing to advise your foreman when and how you were injured there is no means of knowing that you were injured.

Numerous other accidents of a more or less serious nature have occurred in your plant which could have been prevented by a little forethought. Accidents do not happen; they are caused by someone's thoughtlessness. Either because the injured did not think before he acted, or through the thoughtless act of a fellow workman. Examination of the average accident report reveals numerous injuries resulting seriously, many times from falling objects from elevated positions. Cause: someone—repairman, stock handler or other person—thoughtlessly or carelessly left tools or material near the edge of a platform or scaffold or top of a step ladder, etc., after a repair job had been completed. For instance, when working on cranes, care should be given as to where tools are laid while the work is in progress, and to see that no bolts, broken parts, etc. have been left on the bridge or trolley where they will eventually jar off and possibly fall on a workman on the floor. Where a platform or elevated floor has an open side, where any material may accidentally fall to a lower level, a toe board at least 6 inches high should be provided along the edge in addition to a handrail which is absolutely necessary.

We receive countless numbers of reports of injuries due to nails protruding from boards left lying about after a repair job, or while unpacking stock. All of such injuries are attributed to the careless act of the person who left the nail in the board. Almost invari-

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ably blood poison is the result of an injury of such nature. Remedy: Never leave a nail sticking point up in a board or stick. It does not take any more time to pull the nail out entirely, or at least to bend it over, than it does to throw it down and take a chance that no one will step on it until you finish your job. Numerous injuries are caused by the careless piling of material—piling articles one upon another to unnecessary heights—in such a manner that some times the vibration of the floor will cause this pile to topple over.

Again, when cranes are used, it is necessary for persons to climb atop the pile to unhook or hook on to the objects, and if the pile is not built up properly they will fall.

Much care can be given this feature in your foundry, in the handling of flasks, cores, blocking, patterns, etc. Objects carelessly thrown in passageways and about working places in the shop are the causes of numerous accidents which can be avoided by providing a space in which to pile necessary blocking, etc., carefully piling raw stock and finished materials where they are not likely to fall over nor to trip a passerby. You know the results in your foundry of a man handling a ladle of molten metal being tripped by a tamping bar on a block of wood, or a pile of sand left in the aisles.

This leads me to touch on the proper clothing advocated for men handling molten metal—congress type shoes are unquestionably safer than laced or buttoned shoes. They prevent small particles of metal readily burning the wearer and are certainly easier to remove quickly in the event of a bad splash.

The wearing of canvas leggins in addition to congress shoes is very good practice; although not generally used there are a number of plants throughout the country where foundrymen are required to wear leggings when handling molten metal and are required to wear congress shoes at all times. I venture to predict that the time is not far distant when employes will be required to adopt this method of sensible dress in every foundry in the country. Loose sleeves, flopping jumpers, flying neckties are conducive to accidents to persons working about machinery. Jumpers should never be worn outside of the overalls, sleeves should be buttoned about the wrists. Above all neckties should not be allowed to fly loosely. I recall a serious injury to a young fellow working on a lathe when his necktie coiled about the job he was filing. Another where a necktie caught in the feed rolls of a machine. Wearing finger rings is bad practice. In a shop where I once worked, a machinist had his ring pulled from his finger when it became hooked on a belt lace, taking every bit of skin off the finger. I also recall a case where only a slight injury would have resulted except for the fact that the injured man wore a ring. His hand was slightly crushed but the ring finger was seriously mangled by the ring breaking and closing in on the finger.

TOOLS

The tools and equipment used in performing one's work should be in good condition or put in such condition before being used. Hand hammers and sledges should not be used if loose on the handles. Hammers, sledges and chisels should never be used if burred or mushroomed. I could recite a number of injuries inflicted from this cause, all of the injuries were not suffered by the persons using the defective tools, but to persons nearby. A chip flying from the head of a hammer or chisel can travel with the speed of a bullet. It becomes necessary then for one to hand his burred chisels to the blacksmith for redressing and to see that one's hammer heads are in good shape and securely wedged to the handles.

Where it is necessary to work on a job elevated above the floor, one should make for himself a substantial scaffold. Don't take a chance by standing on a barrel head or shaky box. If it is necessary to stand on a barrel place a board across the staves. Where the job is elevated so that a ladder is necessary, secure for yourself a strong

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ladder, and one with safety feet which will not be likely to slip out from under you. If you should for any reason make a ladder weak, or rickety, break a rung or a riser, give it to the carpenter for a repair job. Don't take a chance with it. Just bear in mind that the four chief causes of accidents are: Men falling from high places; objects falling on men; persons dropping things, and improper handling of tools.

In this connection I have in mind a careless act of a man in a certain shop, which resulted in the loss of a couple of toes and other painful injuries to his foot, caused by laying a heavy machine part which he was repairing, on a bench; through hammering and pounding on the bench in connection with his repair job, he caused the machine part to jar from the bench on his foot. A little thought on the part of this man would have prevented the agony which he suffered.

The sling chains, ropes, and cables used for hoisting heavy loads need close attention, necessitating frequent periodical inspection of each link, ring and strand. Much depends on the strength of the sling and a chain is no stronger than its weakest link. Don't take a chance in slinging a load, make sure it is safe before starting the load. Practice safety first and always.

Reference up to this point has been to matters which have caused much suffering in other plants, which can happen in any plant but cannot be prevented by mechanical guards. The only known remedy is for all of us to "Think before we act." "Cut out taking chances." "Think of the other fellow," and as Davy Crockett said, "Be sure you are right, then go ahead."

You cannot help noticing that your boss has for the past year been erecting guards around belts and pulleys, enclosing gears on machines, which we all know cost a lot of money for material and time to construct and erect them. Why do you suppose he has gone to this expense? For your protection, for the protection of the man working on and about the machine. He must have been convinced that there was an element of danger there for the worker or he would not have gone to the expense of providing a guard for the hazard. The fact that he has guarded against possible injury to you, Mr. Machine Worker, shows that he is willing to do his part and solicits your co-operation in the upkeep of those guards.

It is every man's duty as a safe workman to replace as quickly as possible all guards which it may be necessary to remove and not to render a guard useless. Rather suggest to the foreman practical means of more fully guarding any point where there is a possibility of an accident.

The managers of your plant have decided to start a safety organization composed of foremen and workers. All of you may at some time be called upon to act as a member of a committee to make an inspection of the departments of the plant for the purpose of offering suggestions for safeguarding dangerous conditions about the buildings, yards, machines and transmission equipment; to report on conditions of safety devices already installed; to offer suggestions for improvement of present guards where you can see a defect, and to make suggestions for practical guarding of conditions which may cause an accident. You may find occasion to suggest a more efficient means of carrying on a certain operation in some part of the shop which would eliminate certain dangers to workers performing the operations. Safety organizations are operating along these lines in many plants throughout the country and each year finds new safety organizations started and considerable interest is shown in the work by employer and employe. It is good business, men, and you are most benefited. Employers all over the country are spending barrels of money to make their shops safe work places. Only a few years ago one would hear a boss state that accidents were unavoidable, that each industry was bound to have a certain number of fatal accidents. In this day we know that the majority are avoidable and steps are being taken for their prevention.

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It is strange to relate, but nevertheless it is a fact that the strongest kickers against the safety movement are the workers themselves. They kick against having safety devices installed on their machines, kick against wearing goggles and congress shoes and there are numerous trivial kicks. It is beyond me to understand why a person will object to carrying out a shop rule which is for his interest or why he will try to discourage the installation of safeguards on his machine when it is for his protection. If one will stop to consider that he is the man whom the boss is protecting, that he is the one who suffers the pain of the injury, not the boss, and that he is the fellow who receives the compensation which cannot compensate for one's suffering no matter how much he receives. If a worker will realize this I am sure that he will assist the boss and his inspector instead of criticising all of the suggestions. Begin to realize that you are not the only one who suffers as the result of an accident, but that your family suffers as well. They feel the effect of the cut in your pay envelope, they are in fear and dread after the first accident, causing loss of time, that you may at any time be more seriously injured, and they heave a sigh of relief when they see you safe at home again. Have you ever given any thought to the inevitable results of a serious injury? Have you ever thought what would become of that happy family which you have just left at home should your earning power be reduced through the loss of an eye, hand or other part of your body? Wouldn't it mean that the wife would have to find some work to do? Wouldn't it mean that the boy, for whom you have planned to give a better education than you yourself had opportunity for, would have to go to work sooner than you or he expected, or that the little girl would be deprived of the high school and musical education which you and the wife have taken pleasure in planning?

This can happen, men, and by your own careless chance taking; therefore let me suggest to you, Mr. Foreman, when you hire a new man in your department that you show him the safe way to perform the job to which you have assigned him, give him a copy of your shop rules or show him the location of the bulletin board and be sure he understands. And you, Mr. Fellow Worker, show Mr. New Man the safe practices which you have acquired. Show him a little brotherly love; don't be afraid that you will make his surroundings too comfortable for him.

Don't let your safety work stop when you leave the shop. Carry it to your homes and make your children think safety. Be reasonable with them, don't make mollycoddles out of them, but impress on them the dangers of hitching to wagons or automobiles, walking on railroad tracks, playing in roadways where they may be run over and crippled. Read to them the newspaper accounts of accidents which come to your attention. In other words, gentlemen, let safety sink into your heart, think safety, eat safety, and dream safety.

Two Daddies and Their Daughters. Which Are You?
(National Safety Council, Chicago.)

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Safety Bulletin Box

By James B. Douglas

Manager, Claim Department, United Gas Improvement Company

I SEND to SAFETY ENGINEERING a photograph of a U. G. I. Safety Bulletin Box just gotten up, which is commanding instant attention from workmen. We are expecting to put them in use at our plants and shops.

In addition to being a receptacle for suggestions, the box provides a new and unique arrangement for the display of standard letter size, safety council bulletins. It has also standard openings for lantern slides and descriptive notes, which show through a winking light.

It is strongly made of light sheet metal, and contains a flashlight, lamp, double glass sides, necessary electrical connections and a short section of insulated cable which may be extended through an insulator at the upper corner on either side of the box. The exterior is enameled in safety green, and the interior is painted in aluminum, making in all a piece of office or shop furniture which, we believe, will prove attractive to our employes.

All information and illustrations are translucent and easily read. The measurements of the box are approximately 12 x 22 x 20 inches.

I do not know of anything just like this bulletin box.

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Illness in Industry: Its Cost and Prevention

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THE obligation of an employer to the State requires certain things of him as matters of good citizenship: for instance, that his workmen shall have a living wage, that child labor shall not be employed, that injuries from accidents shall not make workmen a charge upon the State. Affairs of this kind are not taken up as philanthropy. It is good business.

For years, the poisonous effects of lead, phosphorus and dust have been emphasized and their elimination has been urged; but the more important and everyday physiology of the workman himself has been neglected.

Accident compensation has been enacted in 33 States, it has been shown that it pays both employer and employe. A further step is the recognition of sickness and disablement, independent of accidents, not only because of their immediate cost to the worker and to the employer, but because continued efficiency in work and business depends largely upon health.

ILLNESS CAUSES MORE LOST TIME THAN ACCIDENTS

Records show that the time lost by employes, through illness, ranges from 4 to 10 times that lost as the result of industrial accidents. The loss to the employe through accidents occurring in the course of his employment is now generally recognized as a cost which should be borne by the industry and not by the individual. It has been argued that the cost of illness should also be transferred from his shoulders. Illness prevention may some day become as essential from the standpoint of operating costs as accident prevention now is. As a matter of fact, illness in industry already has an effect on operating costs that is far from being generally realized.

COST OF HEALTH SUPERVISION

The cost of health supervision is not large, as is shown by a comparison of the cost of health supervision in 99 industrial establishments, employing altogether 495,544 men, made recently by M. W. Alexander, for the Conference Board of Physicians in Industrial Practice. The figures vary rather widely, since some plants reported only the medical cost while the majority included the cost of clerical assistants and even of janitor and scrubwomen. The average cost per man per year for the 500,000 employes was $2.50, or about ¾c. per day. Two of the companies not only give medical and surgical attention to injured employes, but furnish all the medical attention required for the families of workmen, as well as for the men themselves. In the case of an iron-and-coal-mining company employing 11,000 men, the cost of giving all the medical attention required for the men and their families amounted to $11.82 per man per year, or less than 4c. per man per day.

If, then, health is so important to industry, we must know the conditions upon which it may be enjoyed. We may consider the subject under three heads:

1. Personal hygiene, or care of themselves by employes.
2. Care of employes by employers.
3. Care by Federal, State, or municipal authorities in the making and enforcing of laws.

PERSONAL HYGIENE

Taking up first matters of personal hygiene and the care of the individual,

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the things to which a workman should pay particular attention are: Regulation of his meals as to the amount, character and mastication of them; the amount and character of drink; hours of rest and sleep; ventilation of rooms; personal cleanliness; clean clothes; washing of hands before meals; brushing of teeth; daily washing of feet; proper fitting of shoes; amount and kind of clothing; care of the eyes, ears, and nose; regularity of movements from the bowels; regularity of work, and the cultivation of cheerfulness. The mind has much to do with the body, and especially with tissue changes and secretions.

It is impossible in this article to take up every one of these subjects, but as illustrations, two may serve our purpose. Let us consider the importance of washing the hands, particularly befor each meal.

To Oliver Wendell Holmes and to Ignaz Philip Stemmelweis we owe the beginning of our knowledge that disease is carried by the hand. They demonstrated that puerperal fever and erysipelas were carried in this way, and Lord Lister started us on the road to its prevention. Today we know that most disease is carried by contact with the body or with its secretions. There is no known method of perfect disinfection and cleansing of the hand. A culture test for bacteria on the hands after washing without using a brush shows a relatively high count; but if a brush is used, more particularly if the hand is afterward rubbed with a rough sterile towel, the bacterial count is much smaller. Fortunately, septic conditions do not arise when the bacteria are very few in number; infection depends upon the number and virulence of the bacteria.

INFECTION BY HANDLING OF FOOD

Perhaps the most striking illustration of infection caused by the handling of food is a case that has appeared in the daily press. While Commissioner of Health of New York City, my attention was called to a certain cook named Mary Mallon, or as she was called in the newspapers, "Typhoid Mary." Mary had lived with a number of families. It was noted that in whatever family she lived some one soon became ill with typhoid fever. The physician who had noted this, Dr. Soper, found that 26 cases of typhoid had occurred in these families. Under the power granted to the Board of Health for the preservation of health and the protection of the public, she was removed to the hospital for observation, and it was found that some of her ejecta were almost pure culture of typhoid. She declined to undergo any operation; and as other treatment did not cure, she was deprived of her liberty as a menace to the community. In this course, the Department of Health was sustained by the courts. But the following administration, upon her promise not to ply her occupation as a cook, gave her liberty, and for several years nothing was heard of her. In January and February, 1916, at the Sloane Maternity Hospital, 25 cases of typhoid fever occurred. A careful inquiry as to the cause of the outbreak led to the discovery that Mary Mallon was the cook. The only way in which she could convey the disease was by contaminating the food through failure to cleanse her hands properly.

FACILITIES FOR FREQUENT WASHING OF HANDS

If disease is so easily acquired from soiled hands, what is the lesson we are to learn? Workers should have facilities for washing after going to the toilet. Particularly they should be encouraged to wash their hands before taking their lunch from the basket. Even though not pathogenic, the bacteria carried to the stomach from unclean hands may cause trouble. But this is not the whole story. An observer at a public hearing of the New York State Workmen's Compensation Commission, noting the victims of accidents as they appear there, would be impressed with the large number of deformities of fingers and hands due to infection of wounds. Case after case has come before the commission, where such poisoning has resulted in necrosis of bone and made necessary

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its removal; or tendons have been divested of their sheaths and become fastened to the tissues and are no longer able to operate; or the muscle itself has been destroyed by an abscess; or nerves have been ruined, causing paralysis; or joints have become ankylosed and will not bend. As a result, the fingers and hands become deformed, twisted, and useless. Thousands of dollars in compensation have been lost, and many a good workman has been incapacitated for life. Clean hands and clean skin would help to prevent much of this infection.

MOUTH HYGIENE

Let us take a second simple illustration. That of mouth hygiene and brushing of teeth. Food can be properly masticated only if the teeth are in a healthy condition. It follows that good teeth are desirable, and a factor in energy. One eminent medical authority has stated that decayed teeth are even more harmful than alcohol. But the harm of decayed teeth and unclean teeth is not so much the difficulty encountered in chewing as the fact that they make an unclean mouth, and may produce abscess.

It is only recently that much attention has been paid to this latter result. It is growing in importance in the minds of physicians. In the practice of their profession, physicians find among their patients many persons who suffer from an infection that is confined to one spot in the body, focal infection, but that is the cause of, or relates to, general disease of the system. By far the most frequent location of such infection is in the mouth or throat. Decayed teeth, and abscesses, the result of such decay, often affect the whole body, and even when not the primary cause intensify and prolong disease.

We now know that many cases of rheumatism, *arthritis deformans*, tuberculosis, various forms of heart disease, and disease of other organs, arise from tonsilitis or some other diseased condition of the mouth or teeth. But even though local disease may have such serious consequences and be the origin of dangerous and frequently fatal disease, to my mind it is not of so much importance as another sequel of an unclean mouth.

MYCOLOGY OF THE MOUTH

A study of the mycology of the mouth shows that various disease-producing bacteria may inhabit it; at least 50 different forms have been found there. Many well known species, some of which occur only in the mouth, are associated with disease of other parts of the body. The mouth always contains some bacteria, sometimes only a few species, sometimes many! sometimes few in quantity, sometimes in vast numbers. In pyorrhea which loosens the teeth and is accompanied by an exudation of pus from the sockets, millions of microbes are found in the pus.

To my mind the harmful effect is produced principally by swallowing these bacteria, especially by having them mingle with the food in the process of chewing. If there is not sufficient gastric juice to kill them, they produce a fermentation of the food, and then, passing out of the stomach into the intestine, produce poisonous products of decomposition. These, on absorption, produce bodily fatigue and lower resistance to disease. Much of the sour stomach, dyspepsia and other stomach troubles from which people suffer are due to contamination of the food by bacteria from unclean mouths. In the many experiments and observations made by Dr. Beaumont in connection with his patient, Alexis St. Martin, he noticed that pure gastric juice would often keep indefinitely, but if mixed with much saliva it quickly spoiled.

FOOD CONTAMINATED IN THE MOUTH

We are careful, especially with children, that water be boiled, milk scalded or pasteurized, and food generally well cooked in order to destroy bacteria. If food be carefully selected and prepared, danger from that source is reduced. But all this care may be in vain if the food becomes contaminated in the mouth. Such precautions would

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seem of little value unless the teeth be brushed and the mouth cleansed and disinfected both before and after each meal. Of the two, it seems to me that cleansing before meals is the more important. Still another thought in this connection is: If food, sugar for instance, that enters the stomach undergoes fermentation there and is split up into its constituents, some energy is lost to the body; for it is by this very splitting up of food within the muscles that energy is produced.

How do bacteria get into the mouth? Some enter with the food; some inhabit the mouth and multiply upon the remains of food left between the teeth; many enter with dust while breathing, particularly the dust of the street; still others get into the mouth from the hands. Is it too much to hope for that in the future every workman will not only have a proper place to eat his noon meal, but will also wash his hands and brush his teeth before he eats it? It seems to me that it would pay well from the standpoint of lessening fatigue for every worker to use a toothbrush before every meal, to have one in his locker and use it at noon. Yet where is this the case now? Still, I confidently expect that in a few years this will be common practice.

CARE BY EMPLOYERS

Leaving these matters of personal hygiene, I will endeavor to enumerate the subjects that may be considered by those in charge of industrial establishments as follows:

Drinking water supplies.
Washing facilities.
Laundries.
Lockers.
Toilet arrangements.
Drainage of sewage disposal.
Disposition of garbage and rubbish.
Care of stables and animals.
Heating work places in winter.
Cooling work places in summer.
Ventilation.
Overcrowding.
Dust, gases and fumes.
Lighting.
First aid.
Hospitals.
Trained nurses and social workers.
Physical examination of employes.
Lunch buckets and lunch rooms.
Commissaries (bread, meat).
Milk supplies.
Flies, mosquitoes and vermin.
Clean mills and yards.
Housing.
Gardens.
Rest and recreation.

In addition to these, which have to do with physiology and hygiene, there are others such as prevention of accidents, education, etc. To give the reasons why each of these cases should be considered would fill a volume; let us consider only one of these subjects as an illustration.

PROPER DRINKING WATER SUPPLY

What reason, for instance, shall we give a manufacturer for the installation of a proper drinking-water supply? How shall he justify the expenditure to the stockholder?

As a basis for the consideration of drinking water supplied in connection with industrial plants, it is necessary to study the physiological uses of water in the human body, that is, the effect of water on secretion, excretion, temperature, energy, and other body processes. Water is a natural constituent of the body. Normally it comprises about two-thirds of the body weight. In chemical combination it enters into the substance of the tissues; they are all largely composed of it in varying degrees. It is the main ingredient of the fluids of the body, and helps maintain their proper degree of dilution.

The great importance of water is shown by water starvation. People may live many days without food, but they cannot go long without water. If there is insufficient water in the body, all secretions are lessened and there is dryness of the membranes and change in the functional activity of various organs. Thus there is lessened digestion and absorption of food. Intestinal excretion is retarded; abnormal products are absorbed; there is lessened excretion and increased friction.

Water is nature's great solvent. Tak-

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en with food it increases the utilization of food. It aids absorption of food and carries nutrient material through the medium of blood and the lymph to the tissues in the various parts of the body. Solution is one of the essential steps in digestion. There is widespread belief that to drink water with meals is injurious. On the contrary, one of the most common faults in eating is to neglect to take sufficient water with meals.

We may determine the amount of water necessary to maintain the system in a normal healthy condition by a study of the amount lost through the kidneys, the skin, the lungs, and the bowels. In general, the average total of these losses in an adult is 5 pints. This amount must be taken daily. Allowing a pint and a half of water to represent the average water content of the food eaten, the remainder, 3½ pints, about 7 glasses, must be taken as drink in some other form. These figures vary greatly according to the weather and work. Hot weather and exercise increase the demand for water.

Besides carrying food in solution to the tissues, water also carries waste away. Not only is there a building up process by absorption of food, but there is also a constant wasting process resulting from the production of heat and energy. These products of waste must be rapidly eliminated or they may have a fatiguing effect. They are carried away by the blood stream to be eliminated principally by the lungs and the kidneys. If the wastes from muscular energy-lactic acid and carbon dioxide accumulate, they poison the system and energy is diminished. This accumulation is sometimes due to a lack of water in the system from not having taken sufficient drink.

The blood tends to maintain its equilibrium. If more water is taken than is needed, the kidneys and other channels of elimination work faster; the water is more rapidly eliminated and carries with it more waste. Water thus increases elimination and secretion. Absorption of water increases the fullness of the vessels and this promotes secretion. When taken into the stomach, there is always in addition some increase in the secretion of the gastric juice. There is also increased motion of the muscles of the stomach and the intestines. Besides the functional secretion of the various organs, there are many membranes which must be kept moist to avoid friction. Among these are the linings of the joints, the coverings of the tendons of the muscles, the coverings of the lungs and the coverings of the intestines.

The normal temperature of the human body is 98.6° F. in all seasons and in all climates. Any rise in body temperature disturbs the normal functions of the various organs of the body. While a certain amount of heat is produced in glandular and other structures of the body, the muscles are the principal source of heat production. Loss of heat which accompanies loss of moisture takes place chiefly through the lungs and the skin. In active exercise and muscular labor, heat is rapidly formed, and, if not lost by perspiration and by exhalation of moisture from the lungs, it accumulates and the body temperature rises above normal; the individual becomes feverish. This is not infrequently the case in humid days of summer, because radiation and evaporation are largely retarded by a high percentage of humidity in the atmosphere.

Recent investigations tend to show that the unhygienic condition of crowded workshops and of schools and the lowered vitality of workers and school-children are due to increased body temperature resulting primarily from an accumulation of moisture in the atmosphere. Water not only regulates the degree of temperature of the body but acts as a distributor of heat, carrying heat from one portion to another and equalizing the temperature of the body.

The temperature of water affects its attractiveness; water that is lukewarm is not palatable, and ordinarily people will not drink a sufficient quantity of it. The temperature of the water also affects health; iced water, if taken in large quantities, frequently producing cramp. While water should

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not be iced, it is well in summer that it should be cooled. The temperature should be about 50° F. Cold water of this character stimulates the heart. It also somewhat relieves the internal temperature. Imbibing a sufficiency of water removes thirst; thus the drinking of water probably tends to lessen alcoholism.

Many cases of dysentery, diarrhea, typhoid, and some cases of indigestion and intestinal disturbances arise from bacteria in water. Of the various methods of typhoid infection, the drinking of polluted water is the cause of by far the greatest number of cases. Asiatic cholera is almost exclusively a water-borne disease. In addition, water may carry worms and other animal parasites.

PROPERLY DESIGNED DRINKING SUPPLY

Disease may also occur from drinking cups being used in common. Medical researches show that some of the most serious diseases can be communicated through the common drinking cup. To remove this danger, sanitary fountains are constantly being installed. To encourage adequate use of drinking water, it should be attractive; it should be close to the worker; it should be wholesome; the temperature should be regulated; the common drinking cup should be abolished and sanitary fountains should be used instead. It is necessary that these should be properly designed, since some types now in use are almost as likely to be a source of infection as the common cup. Lead pipes should not be used for the distribution of drinking-water supplies.

REVIEW OF WORK IN IRON AND STEEL INDUSTRY

To discuss all the other topics from the physiological standpoint in similar detail would require too much space, so I will conclude with a brief review of what has been done along these lines in the iron and steel industry, with which I am associated.

Much has been done in the installation of basins and showers and in the erection of dry-houses. In many places these have had the widest use, a large percentage of the employes bathing daily. Here again we cannot adequately estimate the good derived. But we do know that such facilities enhance one's self-respect and the respect of others. The opportunity to wash before going home makes the work of the home less burdensome, and cleanliness of the hands is of especial importance because hands carry disease.

Shower baths affect the circulation of the blood, not only in the skin but in the whole body. They produce a redistribution of the blood in the body and for the time being there is an actual change in the blood itself. They eliminate more rapidly the products of waste and so constitute one of the methods of relieving fatigue. Cold showers increase capacity for muscular work. A shower bath removes the waste products from the skin and makes one less liable to harm from a change in temperature. It reduces the heat of the body, especially on humid days when the body temperature may rise above normal. Incidentally, I would mention that the roller towel has been abandoned in the majority of plants.

Many new toilets of modern construction have been built and hundreds of old privies have been abolished. Especial care has been given to the exclusion of flies and the prevention of pollution of the soil. There have been many improvements in the disposal of collection from pan privies, especially by incineration or in septic tanks. Much pollution of streams has been done away with. Thousands of dollars have been spent for drainage, particularly of back alleys and streets. This drainage has had a very beneficial effect in the prevention of the breeding of mosquitoes and prevention of malaria.

Better methods of collection of garbage are constantly being installed, with frequent periods of collection. Much has been done in the way of educating employes in the use of garbage cans and the necessity of keeping the contents covered, in order to prevent the carrying of bacteria by flies from the can to the table. Toward preventing the breeding of flies much has been

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done, especially in mining camps and villages, by the prompt removal of manure and by making stables more sanitary. Education by circulars explaining the danger of flies as carriers of disease has accomplished much.

The cooling of work places in summer is now being considered in many plants, and much is being done to make heated work places more comfortable, thus preventing heat stroke.

Thirty years ago, according to English statistics, nearly all who breathed dust from grinding steel and stone, died sooner or later from tuberculosis. Such dust has been entirely eliminated from certain mills in the industry. Air conditions have been much improved by the elimination of the hydro-carbon series and other gases produced by open fires where combustion is incomplete. These gases are now carried to the outside of the building. Much improvement has been made in the heating of plants in winter by fresh air brought from the outside, filtered, warmed and distributed to the various parts of the building to be heated. This insures a good supply of air free from dust and gases.

How often have men fallen upon fruit skins or the remains of luncheon thrown upon the ground, or have stepped upon a plank in which a rusted nail has been sticking out! Perhaps more has been done in the making of clean yards than in any other direction. It is also to be noted that the physiological effect of pleasant and clean surroundings has an excellent effect upon the workmen. Beauty and order are persuasive everywhere, and few people can resist them.

Progress in first aid has been so wonderful that the steel industry is now leading the world in this line of welfare work. The reduction of septic cases, from 50 per cent to 0.1 per cent speaks volumes. Nowhere else in the world has such provision been made for the care of employes who are injured. The emergency hospitals which have been provided near mine and mill stand today as examples for the whole world. They have materially aided in reducing human suffering. Many lives have been saved, much has been done to prevent fatal termination, by prompt care and by the knowledge on the part of the injured workman that such care is the best that can be obtained.

A rest farm for the wives of employes who are in poor health has been established. This farm is under the care of a physician and a nurse. The support given settlement houses and the employment of trained nurses have done much toward keeping the companies in sympathy with employes and replacing despondency with sunshine and gladness. These trained nurses have given their attention to the women and children, particularly babies. Their duties include the weekly weighing of babies, teaching mothers how to dress and undress them, how to modify their milk, the guidance of expectant mothers and nursing them during confinement, the care of children, school inspection and other things too numerous to mention. Domestic educators have taught them how to clean house and the essentials of good housekeeping.

What the race will achieve in the future depends much on the conservation of the health of the children of the nation and in the education of these children. Many efforts have been put forth in the industry for the prevention of disease among children. The establishment of playgrounds is a step in this direction. Play is essential to the education of a child, and these playgrounds promote health, education, morality and happiness. They promote health by the effect of sunlight, of fresh air, of exercise on body processes, and by inducing appetite and healthful sleep. At many of the playgrounds certain accessories have been provided which aid both in education and in health, such as drinking fountains, wash rooms, and water closets, and teachers have been provided to instruct in play and in the use of these accessories. Club houses have been erected, and much has been done to provide recreation for all ages.

All energy being derived from food, good food is then of great importance. Some plants have provided dining

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rooms and restaurants, with freshly and properly prepared and well selected foods, furnished at the lowest practicable price, served under cheerful and pleasant surroundings. To prevent ptomaine and toxic poisoning, commissaries are often essential in order that food may be properly protected from flies and kept from spoiling by means of refrigerators. As with milk, they also fix the standard of quality.

Many a man has been kept awake by a crying child, and injuries have happened from the worry over the sick child at home. Such conditions have been done away with in certain places by furnishing certified milk at a reasonable cost, some companies having herds of cows for this purpose.

Good housing is essential to both health and contentment, because it is at home that the workman builds up his strength to perform life's duties. Much has been done in the erection of excellent houses on healthful and sanitary sites, rented or sold at reasonable rates. Many have all modern conveniences.

Construction camps have been improved. Some of recent design have the appearance of a tuberculosis sanitarium and are just as good in construction.

Of distinct economic value has been the encouragement given by employers to those living in mining and industrial villages by fencing in plots for gardens, assisting when necessary in plowing and fertilization, and stimulating the employes and encouraging them in thrift and industry by offering prizes for the gardens. These gardens reduce the cost of living—some yielding vegetables enough for the family and also a surplus for sale—and they promote health by bringing the members of the family into the fresh air and sunshine. They mean cleaner yards and better care of drainage and waste, thus preventing odors and the breeding of flies and mosquitoes. They provide a greater variety of food, for many workmen eat too much meat, and an excess of flesh diet is not conducive to the best work, growth, or health. They tend to abolition or the confining of domestic animals. They promote morality, keep the owner from the saloon and promote his own self-respect. They help make homes and have a refining influence on the family.

Sixty-three Accidents in Mines

THE following table shows that 63 accidents were investigated by members of the Bureau of Mines during the last fiscal year. In these accidents 629 men were killed, 1,140 escaped unassisted, and 113 men were rescued through the efforts of volunteer miners, company officials, State mine inspectors, company rescue crews, and members of the bureau. Of the 629 men killed, 136 lost their lives in munitions-plant explosions. Of the 63 accidents investigated, 49 were in coal mines, 8 in metal mines, 3 in munitions plants, 1 in the Cleveland waterworks tunnel, 1 in railroad shops at Louisville, Ky., and 1 in a foundry at Pittsburgh, Pa.

The accidents may be classified by causes, as follows:

Gas and dust explosions	28
Mine-car accidents	2
Electric shock	1
Hoisting accidents	3
Cave-in	1
Gas-engine fumes	1
Explosion of dynamite or other explosive	5
Fires	8
Misplaced or overcharged shots (includes shot-firers' explosions due to "shooting off solid")	8
Oxygen-tank explosion	1
Suffocation from gas accumulation	1
Unknown	2
Coal rush	1
Boiler explosion	1

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Hazards in Sheet Mill Practice

By J. M. Woltz

Safety Director, Youngstown Sheet & Tube Company

WHAT are the greatest hazards in sheet mill practice? Our records may or may not be the same as others. In fact, we have never seen any published figures on this line of work. We hope for the purpose of accuracy and to enable us all to present figures that have the same value and are understandable, the National Council will soon adopt some standard scheme of accident values and records.

The table herewith takes into consideration, with two exceptions, only such anatomical parts as show 50 or more reported accidents.

	Number of Accidents.			Number of Days Lost.		
Part.	1915.	1916.	6 Mo. of 1917.	1915.	1916.	6 Mo. of 1917.
Eye	983	524	225	95	159	63
Fingers	577	429	220	301	529	350
Forearm	231	150	54	228	169	103
Hand	116	102	43	78	183	22
Thumb	115	95	32	114	82	0
Wrist	113	71	35	90	142	16
Foot	59	51	34	99	229	265
Toe	54	44	17	222	255	16
Cramps	305	89	24	65	166	22
Back	18	24	12	319	208	33
Thigh	22	32	25	165	124	35

The majority of the eye cases were not serious and did not result in any lost time. As a rule, if an eye case was serious enough to be off at all several days were lost.

The fingers show the highest percentage of injuries and these are divided into cuts, bruises, burns and crushes.

The forearm is next on the list, with cuts, burns and bruises as the predominating causes, and the same is true of the other parts so far as injury is concerned.

While cramps can hardly be classed as accidents, they are one of the serious hazards of sheet mill operations. We have given most careful consideration to preventive means, and while we feel that there has been some progress made, we are not satisfied with the showing and hope, when measures now in process of being worked out are completed, to be comparatively free from this hazard, at least so far as it is possible through any effort of the company.

The writer believes that if sheet mill employes can be made to see the need of right care of the body, the use of proper food and drink, the cramp problem will be well on its way to solution.

Drinking water of the right temperature has a marked bearing on the frequency of cramp cases, but our observations do not indicate that it has any effect upon their severity. No month of the year appears to be free of cramps, but, needless to say, the hot months show by far the greater number. It will be noted there is a marked reduction in cramp cases in 1916 over 1915. While this was to be expected owing to a reduced operating force in the sheet mills in 1916, the percentage of reduction is greatly in excess of what one would expect from this cause.

Various experiments were made in an attempt to cut down on cramp cases, and finally we installed in the standing on the catcher side of each pair of rolls, a set of grates over an opening that permits a stream of cool air, under low pressure, to flow continuously upward. This has proven to be a wonderful help in reducing cramps. Another thing that has

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helped to lower the number of cramp cases has been the examination of applicants for employment by the medical department, enabling them to prevent the employment of men who are unable to stand the work.

Piling sheet bars and finished sheets too high is a serious hazard that is very easy of correction.

The handling and transportation of sheets and sheet bars also presented some difficult problems, but with the introduction of improved cradles or hooks for crane operations, and the tractor for trucks, these hazards have been materially reduced.

"Stickers" as yet, an unsolved problem with us, are hard to handle and account for many cuts and bruises.

We have installed a drinking water system for the entire mill. A separate unit will be devoted to the sheet mill.

The Man Hoist

Inspiration Copper Company, Arizona

THE man elevator is double-decked and travels in a concrete-lined compartment, about 6 feet square, of the main west shaft. The counterweight travels in a compartment of the main east shaft (100 feet distant from the main west). The cables of both elevator and counterweight wind on the same drum and are 1⅛ in. in diameter. The elevator is operated electrically from its upper deck, and there can, therefore, be no confusion of signals. It can, in an emergency, be operated from a stand at the hoist, but not from both places at the same time. Each deck is designed to carry 20 men, but in order to give the operator plenty of room, the number of men carried on the upper deck is restricted to 16. Folding steel doors are placed on both open sides of each deck. They occupy very little space when open, and when closed effectually prevent anyone from being crowded against the sides of the shaft. The controller circuit is so arranged that the elevator cannot be started until all of the doors are closed and latched; and should any of the doors be opened while the elevator is in motion, the latter stops at once.

Push buttons are provided at each level and surface landing for calling the elevator. Pushing the button on any level actuates a buzzer and exposes a white mark opposite the number of that level on an annunciator mounted on the upper deck. This is, of course, the same call system as is installed in ordinary passenger elevators. A telephone is also installed at each level on the upper deck of the elevator, and beside the hoist; and an additional telephone is mounted on the counterweight to facilitate the examination and lubrication of its guides.

As now operated, the elevator travels at a maximum speed of 600 feet per minute. A speed control mechanism, at 10 per cent excess speed, wedges the safety dogs on the elevator against the guides, and the elevator is stopped. The guides are steel "T's" and are bolted to the concrete lining of the compartment.

A number of other safety devices are provided. The limits of travel cannot carelessly be passed by the operator, as a device attached to the drum of the hoist automatically cuts off the current and throws on the brake when the elevator approaches these limits. The same end is also reached through limit switches placed high on the head frames of elevator and counterweight. Another device stops the hoist should the cable become slack for any reason. A pneumatic cushion in the bottom of the shaft retards the elevator when other devices fail to stop it in time.

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Some Truths About Laundries

By L. D. Miller

Formerly Boiler Inspector, Industrial A ccident Commission of California, now in United States Naval Service

DURING the year 1916 about 500 laundries, located between Sacramento, San Francisco, Bakersfield and San Luis Obispo, were inspected, the number of employes found in a laundry ranging from two to as high as 300. The conditions found in the places inspected led the inspector to believe that these 500 establishments are typical of all laundries in the State.

In laundrics employing 25 or more people, and in a very few employing less than 25, an effort has been made, as a rule, to provide a safe place of employment, guarding the machinery, belts, stairways, etc., to some extent. It was found that the managers of the larger plants were ready to welcome any suggestions that were made to improve the conditions in their plants, and that as rapidly as possible they were following out the Laundry Safety Orders. So I believe that for the present we can pass up the larger plants and describe some of the conditions found in the smaller plants employing from, say, 2 to 10 persons; and the conditions as here described will apply to many towns.

A typical arrangement of the building seems to be a room at the front where all ironing is done by hand; then back of this will be another room, possibly used as a dryer, or it may be, a dining room, as a great many of these small plants board their employes; then back of this second room is the wash room, containing the machinery. The arrangements may differ somewhat from the above. but, as a rule, the wash room is separated from the ironing room by a partition wall.

In a plant of this kind there was seldom any attempt made to guard the machinery, belts, stairs, or, in fact, any part of the works. The proprietor would make the excuse that, as he did all the washing, he and his wife running such flat work machinery as was used, the rest of the employes did not come in contact with this part of the laundry. Therefore he thought he should not be put to the small expense necessary to guard his plant as called for by the Laundry Safety Orders.

This attitude on the part of the proprietor was wrong, because it is a well-known fact that at times the employes will come in contact with all parts of the plant and be exposed to every hazard within the building. Again, the employes may be engaged but 2 or 3 days a week, and that is made as an excuse. This again is wrong. The Workmen's Compensation, Insurance and Safety Act clearly defines what constitutes a place of employment, and further empowers the issuance of safety orders, the fixing of standard safeguards for machinery and the enforcing of safety orders, rules and regulations. The machinery in all laundries must be guarded, where any dangerous hazards exist, irrespective of the fact that the employes are not required to work in this particular department at all times. The proprietor should not overlook the fact that he may be held liable for an injury caused to one of the employes, while that employe may be passing through the machine room to or from the hand-ironing room.

Another great source of danger in the small plant is the steam boiler. Boiler conditions have been found to exist that an outsider would not believe. Common domestic hot water tanks have been found with a water glass connected to the side about the center of the tank as it sets vertical, a pressure gage on the top of the tank and a gas burner under it, a steam pipe running over to a starch cooker or a water tube and a water pipe entering the tank from the street main. The tank is filled with the required amount of water before the gas fire is started and then the steam pressure is lowered below the street water main

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pressure, each time additional water being required. An installation of this kind ought never to be used, as these tanks were never intended for steam generators, even if fitted with safety valves and all other safety appliances.

The regular steam boiler in the majority of small laundries is an abused piece of machinery. It is handled, as a rule, by incompetent persons, it is not kept clean, free from leaks and rust, corrosion or even burning. On a certain type having a small space above the tubes to the shell, it was not uncommon to find the water column set as much as 4 inches too low. There may have been a safety valve of any old type or no safety valve at all, or if the safety valve had been leaking it was removed and a stop valve placed next to the boiler and the safety valve then replaced.

The conditions as outlined above do not apply to any particular nationality, or place, but are typical of all small plants, wherever found, and should be corrected without delay.

Fatalities in Mineral Industry

THE summary statement of fatalities in the mineral industry of the United States for the year 1916 shows a gratifying decrease, according to statistics compiled by Albert H. Fay of the Bureau of Mines, Department of the Interior. The figures represent decreases in coal mines, metal mines, metallurgical works and by-product coke ovens as compared with the previous year. The number of men employed in 1916 was 1,128,257 as compared with 1,067,929 in 1915, and the total number of fatalities in 1916 was 3,224 as compared with 3,076 in the previous year. The principal increase in men employed was in the metal mines and metallurgical works, while there was a slight decrease in the coal mines and quarries.

The fatality rate per 1,000 men employed for the industry as a whole is 2.86 as compared with 2.88 in 1915, while the same figure equated to a 300-day basis is 3.37 as compared with 3.74 for 1915. The principal decreases, based on the 300-day basis are as fol-

Number of Men Employed and Number Killed in the Mineral Industry of the United States During 1916.

	Number Men employed	Equivalent number 300-day workers	Number Killed	Fatality rate Per 1,000 employed	Fatality rate Per 1,000 300-day workers
Coal Mines	720,971	565,766	2,226	3.09	3.93
Metal Mines	204,685	192,455	697	3.41	3.62
Quarries (Inside)	60,944	49,077	114	1.87	2.32
Quarries (Outside) *a*	29,853	27,380	59	1.98	2.15
Metallurgical Works:					
Ore-dressing plants	22,365	23,470	33	1.48	1.41
Smelters	43,829	49,363	36	0.82	0.73
Auxiliary Works *b*	14,007	15,763	14	1.00	0.89
Coke Ovens:					
Bee Hive	18,570	18,591	24	1.29	1.29
By-Product	13,033	15,528	21	1.61	1.35
Total 1916	1,128,257	957,393	3,224	2.86	3.37
Total 1915	1,067,929	822,827	3,076	2.88	3.74

a Includes rock crushers, rock dressing plants, etc.
b Includes shops, yards, construction, etc.

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lows: Coal mines in 1916, 3.93 per thousand 300-day workers as compared with 4.44 in 1915; metal mines, 3.62 as compared with 3.89; ore-dressing plants, 1.41 as compared with 1.57; smelters, excluding iron blast furnaces, 0.73 as compared with 1.05; by-product coke ovens, 1.35 as compared with 1.75. Quarries and bee-hive coke ovens show slight increases.

Dangerous Elevator Doors

THIS cut, says E. C. Wood, chief elevator inspector of the California Industrial Accident Commission, illustrates what may befall anyone who is able to open the wellway door of an elevator, and is a strong argument for equipping all hatchway doors with locks which insure the doors being closed and locked before the car can be moved.

THIS cut illustrates what may happen when an automatic elevator car has no car gate and electric disorders permit movement of the car with the hatchway door open.

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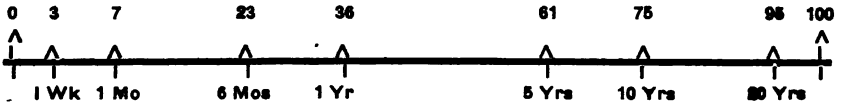
Employment and Safety

By L. L. Park

American Locomotive Company

IS the new man more liable to injury than the older employe or is he more likely to be careful because of the newness of his work? Is the older employe more apt to take chances than the new man? A discussion of these questions may interest those who are helping to boost safety. Considerable light may be thrown on the subject by a study of our accident reports and employment records, for while the smaller accidents which cause no loss of time are not recorded, the reports of serious accidents give some indication as to where the greatest tendency to injury lies.

Taking as a basis the serious accidents for the nine months from January 1 to September 30, 1917, for the four locomotive plants, (the plants engaged in shell work having very different conditions to contend with), we find a total of 829 accidents reported at all four plants. To show more clearly the relation of these accidents to the term of employment in each case, we have given in Fig. 1 the number of men employed for different lengths of time per 100 men injured.



Looking at these figures we see that of each 100 men injured, 3 had been employed one week or less at the time of injury; 7 had been working one month or less; 23, or nearly one-fourth, had been employed 6 months or less; 36, or more than one-third, one year or less; 61, or nearly two-thirds, five years or less; 75, or three-quarters, 10 years or less; 95 had been employed 20 years or less, leaving only 5 of the 100 who were injured after being employed over 20 years.

These figures are rather interesting. That over one-third of all the serious injuries occur to men employed one year or less emphasizes the importance of instructing new men in matters of safety. Here is a fertile field in which the shop safety committees may work with usefulness showing the new-comer the dangers of his particular job and warning him of unsafe practices which he may be following. A talk on safety at the time of employment may help, but it will not go very far. Habits are formed by continued repetition and the safety habit can only be fixed through continued instruction and suggestions by those who know the dangers and the safe things to do.

But is the new man more careless than other men? The fact that more men are injured during their first year does not prove this, since there are so many men who have been employed less than a year. It will be necessary to look at the employment record for such a comparison as suggested above. The most available records are those of the Cooke Works, where the necessary data have been more readily obtained because of the smaller force employed in that plant.

Note the comparison in the following table:

	Men Injured.	On Roll.	Men Injured Per 100 Employed.
1st year.....	37	311	12
1 to 5 years...	6	90	7
5 to 10 years..	8	85	9
10 to 20 years	14	191	7
Over 20 years	2	90	2

While these figures do not prove any fixed rule as to injury, they show a remarkable similarity in the number of men injured per hundred employes in the different periods shown, except among those who have been with the

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works over twenty years. The figure given for the first year is rather misleading and needs some comment. While it is true that at the time the report was made, there were 311 on roll who had been employed less than a year, it is probable that half as many more men were employed and dropped from the roll during the nine months, so that the 37 accidents would be distributed among some 450 different men, or a rate of about 8 per hundred.

Estimates made by other plants seem to confirm the figures shown, so that it seems safe to say that the liability to injury is quite uniform among all employes, except the very old ones. It seems surprising that among the men who have been long in the company's service there should not be a larger percentage of safe practicers than among the strangers just starting with us. Remember that 80 of every 100 accidents are preventable by care and good judgment, and you see the point.

We must not forget that among the new men is the best field for safety education because of the large number of men involved, but our older friends must realize that their influence will help or hinder more than anything else the progress of safety work. You who know the shop and the dangers of the work must first "play safe" if the accident record is to be improved and the shop made safer. Will you help?

As the Employer Says, the Employe Does

THE employer who says a guard is "good enough" does not have a deep interest in the prevention of accidents to his employes, or he would say the guard must be made substantial, and so fashioned that it will prevent accidents, the Travelers Insurance Company comments. A guard which is considered "good enough," but which will not prevent accidents, is frequently worse than no guard at all; for it conjures up a false sense of security, and usually costs more in the end than a good substantial guard, properly installed.

"Guards are not necessary where employes rarely go," is an excuse frequently offered by an employer. As a matter of fact our accident experience indicates that the dangerous condition in the out-of-the-way location is the one which produces the most serious accident. As the employer says, the employe does not often go to this location. He is therefore unfamiliar with the surroundings. Where such conditions exist, the light is usually poor, and this fact increases the danger of the man becoming involved in an accident which should not have occurred. Dangerous conditions should be eliminated, regardless of their location in the plant.

Safety organization, inspection, and education, are the most important parts of accident-prevention work. These things have been worked out consistently and with great satisfaction in many of the large plants in the country. Employers sometimes think, however, that a program of this kind is a good thing for large plants, but that it does not fit in smaller ones. That is not so. True, the large plants need a large organization, in order that it may be effective; but on the other hand the small plants need the fundamentals of the large organization, though they do not need all the details. Systematic safety work is always effective, if the men in authority support it and show the employes that they are heartily interested in it. If a thorough working organization is started and maintained, all the other points which go to make up safety work are carried along with it and the employer gets the maximum benefit in reduction of accidents, efficiency of men, a small labor-turnover, and a better and larger product.

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Crow's Nest Traffic Signal

A "MADE IN DETROIT" idea, an elevated traffic tower.

From this signal box, the traffic officer will have control of six streets that converge at this point, and may signal to eight other officers stationed within a few hundred feet. It is an alarm and signal station also.

The base of the tower is of concrete with a superstructure of steel. The nest is round, is six feet above the ground, and topped by the usual "Stop" and "Go" signs, and red and green lights.

On a recent count by the Detroit Police Department, 20,000 vehicles crossed this point (the hub of Detroit) in 10 hours, making it one of the busy spots of the world.

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EDITORIAL

Electricity Must Be Made Safe

ON the whole Americans have taken kindly to the commercial phrase, "Do It Electrically." But the startling statistics published recently by the National Board of Fire Underwriters may cause the press agents' song to lose some of its popularity. For a year or more, American fire underwriters have been getting ready to analyze the fire waste in the United States by the causes that produce fires. The board created an actuarial bureau, installed the machinery by which big statistical jobs are handled, procured reports of fire losses as adjusted and paid by insurance companies, and went to work.

We now have information as to what caused the fire waste in the United States in 1916. And electricity is charged with responsibility for more than any other single cause, except exposure. Exposure, of course, has nothing to do with starting a fire. It represents a loss by the spread of fires whose origins may have been one thing or another. Electricity and all other causes are active causes, and electricity led every other fire cause in 1916 with a record of $16,559,433 of property destroyed. The underwriters say (their precise words may be found on page 102) that it is the smaller uses of electricity that are most costly—smoothing irons, hair curlers, plate warmers, etc.

We may continue to prefer to "Do It Electrically," but ways must be found to do it safely, at the same time. It is plain that, in these days of conservation, our smoothing irons, hair curlers, etc., are costing the nation too much money.

Conservation of Fuel in Boiler Rooms

ANYTHING that has the effect of diminishing efficiency is of much concern in the manufacturing business. Too large a toll on human energy by industrial accidents diminishes efficiency. So do inferior materials, especially if they cost more than good materials cost formerly. The fuel situation has been and is a perplexing problem, one of its worst features being the very poor quality of the coal that is now on the market. An authority of no less prominence than the Bureau of Mines expresses the opinion that the effectiveness of the coal output of 1917, ton for ton, will be about 12½ per cent less than it should be. Of the 650,000,000 tons of coal transported in 1917, from mines to markets, about 600,000 carloads represented nothing but ash, an addition to the present transportation burden that is extremely serious. In connection with conservation in other forms, manufacturers must arouse themselves to the general need of fuel conservation in boiler rooms.

Systematizing Discussions of Safety

THE New York Local Council of the National Safety Council has adopted a wise plan for its discussions, namely, to take up one practical safety question after another, at the regular meetings of the council, for a thorough debate and exchange of experiences. This is a promising plan for attaining excellent practical results in the shortest possible time.

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Carrying a Sheet of Glass

THIS picture shows how to carry it the wrong way. The Travelers Insurance Company asks the reader to note that the man's hands are opposite each other, near the middle of the sheet. Sidewise vibration is often very marked when carrying glass in this way, on account of the periodic impulses communicated to the plate as the man walks. The strains are also concentrated along a narrow band running across the middle of the sheet, and breakage frequently results.

THIS picture shows how to carry it the right way. Note that the man's hands are no longer directly opposite each other. They have been shifted away from the middle of the sheet—one toward the right and the other toward the left. The tendency to sidewise vibration of the glass is thereby greatly reduced, and the bending stresses are materially smaller. They are also distributed in a safer way.

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The Electrical Safety Work of the Bureau of Standards

By Morton G. Lloyd

Paper Read Before Section D (Engineering) of the American Association for the Advancement of Science, Pittsburgh, December, 1917

IN 1913 the Bureau of Standards began the study of electrical accidents. Statistics were first obtained of the number and kind of accidents, their seriousness, and whether they concerned employes of electrical companies or other persons. Newspaper clippings were utilized in beginning this work, although it was realized that no complete statistics could be obtained in this way. Later the census reports were utilized to get the results of coroners' reports covering 35 States and the District of Columbia. These reports for the years 1913 and 1914 indicated total deaths from electrical causes in the territory concerned of about 300 each year, from which it was estimated that similar statistics for the entire country would give a total slightly exceeding 1,000 annually. Both newspaper clippings and coroners' reports indicated that there were fewer deaths from electrical causes to electrical workers than to other persons, although this seems to be contrary to the general belief.

The study of the statistics relating to this subject was accompanied by the study of the hazards connected with electrical work and with the operation of electrical lines and machinery. These hazards were studied with respect to the prevention of accidents from electrical causes. The elimination of hazards involved the proper designing of equipment, the use of protective devices where necessary, and the proper construction, installation and operation of electrical lines and electrical equipment. Field observations were made in order to investigate the condition of outdoor lines and of the apparatus installed in central stations, factories, etc. A study was also made of rules already existing in this and in foreign countries covering electrical work as well as a study of such specifications as had been drawn up by engineering and utility associations and other bodies. This study and investigation led to the formulation of rules covering the construction and operation of electrical lines and equipment. Rules covering the installation of electrical devices were already in existence and were being applied by the National Board of Fire Underwriters and by insurance and municipal inspectors in all parts of the country. These rules, known as the National Electrical Code, were formulated with the idea of obviating the fire hazard which results from careless or improper construction and unsuitable materials. The rules drawn up by the Bureau of Standards, on the other hand, were intended to eliminate the accident hazard which had been found to be associated with electrical work.

After drawing up tentative drafts of such rules, they were subjected to the criticism of many persons who had had experience with electrical work and many committees of the technical and utilities associations. Conferences were held in a score of cities in different parts of the country to which were invited the representatives of electrical manufacturers, electric power companies and other utilities, insurance interests, electrical workers, public service commissions, city officials, consulting engineers, railroads, etc. In these conferences the rules were gone over in detail and criticism obtained in the light of local conditions and of individual experience. It was found necessary to modify and revise many of the rules in order to make them reasonable, effective and suitable to any conditions that might be encountered.

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The co-operation of the various interests which have been mentioned and which would be affected by the application of the rules was obtained to a very gratifying extent. After two years of such conferences and criticism of the earlier drafts, a complete National Electrical Safety Code was finally published in November, 1916. This was issued for examination, trial, and constructive criticism, as it was realized that rules could not well be put into general effect until subjected to the searching analysis which would come from a fairly widespread attempt to apply them. It was expected that further modifications of the rules would be found necessary after such a trial. The rules have now been in the hands of the public more than a year and it seems probable that when revised it will be necessary to make but few changes in them. No set of rules yet developed has been subjected to such extensive study and criticism, and trial use has demonstrated its reasonableness and practicability.

The National Electrical Safety Code consists of five parts. The first part deals with installations in central stations and sub-stations. Part 2 is concerned with outdoor electrical lines as constructed overhead or underground. Part 3 pertains to the installation of utilization devices, that is to say, it is concerned with the wiring, appliances, and control apparatus installed in factories, residences, and other buildings. Part 4 applies to the operation of electrical equipment. In addition to those mentioned there is a supplementary part giving rules to cover methods of grounding wherever such protective grounding may be called for in other parts of the code.

The only part of the code which has met with any appreciable opposition is the part dealing with the construction of overhead lines. Such opposition as has developed here has been due to the conflicting interests of the different utilities concerned, namely, railroads, power companies, and telephone companies. In order to formulate a general code which should cover all conditions it has been necessary to harmonize the demands of the different interests and to effect a compromise which would be fair to all and which would result in reasonable rules giving an adequate relief from accident hazard. It was, of course, realized that electrical hazards cannot be absolutely removed, and in formulating rules it was necessary to balance the probability and ease of accident against the cost of construction, since any attempt to make accidents absolutely impossible would involve costs which would render the construction and operation of electrical lines entirely impossible. In striking a proper balance between these two considerations there are bound to be differences of opinion which are usually involved to a certain extent with the financial interest of the party in question. It is evident then that some central agency having no financial interest whatever in the matter, yet having opportunities to thoroughly investigate the facts, is the most suitable body to weigh different points of view and come to a conclusion as to the most reasonable and just action to be taken in the matter.

In formulating the rules of the code, full opportunity was given to every interest affected to present its point of view and any evidence that might have a bearing upon the appropriateness of each individual rule, and the result has been a set of rules which are generally satisfactory, although different individual rules are not what was desired by each individual interest. The code has taken into consideration the climatic differences in different parts of the country in so far as they affect the necessary strength of overhead lines, as for example, through wind pressure or loading by sleet. It has taken into consideration the different hazards involved in different situations, such as crossings over railroads, crossings of different sets of overhead lines and conflicts or parallelisms of lines. It has taken into consideration the difference of liability to accident represented by the density of population by making distinction between the minimum requirements for construction in cities and in rural districts. In these

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respects it is the most complete of any of the codes or specifications which have yet been offered for use in this country.

Such opposition to the introduction of the code as has arisen has been due largely to failure to realize the above facts, and failure to appreciate what has been accomplished in the code. Such opposition usually disappears after a thorough study has been made of the code and experience obtained in its application. Familiarity with the code almost always results in the lessening of any initial opposition to the rules, and the most enthusiastic supporters of the code are among those who know it best and are acquainted with its progressive development.

The National Electrical Safety Code as put out by the Bureau of Standards has no legal status whatever and its application cannot be enforced by the bureau in any way. The function of the bureau is to study, investigate, experiment where necessary, and make the results available; results which are obtained without bias for any particular interest and results which it is not feasible or desirable for each utility company, city or State commission, to work out for itself on account of the expense and the needless duplication of effort thereby involved. The bureau's function is not an administrative one, and the application of the safety code must depend entirely upon its inherent merits.

The reception of the safety code has been very cordial. The code has been applied voluntarily by a large number of utility companies. Indeed many of these companies already following the lines of good practice have found it necessary to make little or no change in their construction and methods of operation in order to comply fully with the rules. Other companies have found it a welcome criterion of good and safe practice which they may use as a guide to future work. The same may be said of many industrial plants which utilize electrical equipment. The code has filled a real need of inspection departments, which have heretofore been without any adequate guide in passing upon the accident hazard in electrical installations. This applies especially to municipal inspection departments, to casualty insurance companies, and to State labor and industrial commissions. Manufacturers have found it a useful guide in the design and construction of apparatus which shall meet all reasonable safety requirements. It will be of even greater value to them when it becomes a definite accepted standard throughout all the States of the Union, so that they will have a single set of rules with which they must make their output comply. Indeed one of the main points of value in the national code is the uniformity which it permits in electrical practice in all parts of the country. This not only lessens the difficulties of manufacturers, but is greatly appreciated by those utilities which are operated by holding companies and consolidate their engineering work in departments whose activities cover the territory of several States. Different State or local standards in different parts of the country would add difficulty to manufacturers, utilities, inspectors, and nearly everyone else involved in the administration of safety rules.

There remains yet to be mentioned one of the most important agencies which are concerned with safety rules. These are the commissions in the various States which are charged with the regulation of public utilities. It devolves upon many of these commissions to establish standards of practice in their respective jurisdictions and in certain cases they are also empowered to establish safety standards. The reception of the National Electrical Safety Code by the State utilities commissions has been very gratifying. Many of them postponed the adoption of rules covering this subject until the safety code should be issued. Now that it is available a number of the States have adopted such parts of the code as are involved in their respective administrative powers, and a number of others have recommended its application by the utilities of the State without making such application mandatory. For the present this is the

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procedure which is preferred by the Bureau of Standards, inasmuch as the code is at present undergoing trial and may be found to require some modification before being applied in every particular instance.

A number of Federal agencies are also applying the code, among which may be mentioned the United States Employes' Compensation Commission, and the safety engineers of the Federal navy yards and arsenals.

The safety code has been so generally received as a guide to good and fair practice, and it seems so probable that it will eventually be adopted by the administrative authorities of so many States and cities, that a number of universities and colleges are introducing it as a subject of study in their electrical engineering courses, especially with reference to central station practice and transmission line construction. Among these educational institutions are the Ohio State University, University of Washington, Oregon Agricultural College, University of Florida, and the Agricultural and Mechanical College of Texas. Other college authorities have the matter under consideration and no doubt in arranging courses for the next academic year will introduce the safety code as one of their standard reference authorities

It is the intention to revise the National Electrical Safety Code at intervals somewhat after the same fashion as the National Electrical (Fire) Code is biennially revised. To this end the Bureau of Standards is continuing its study of the subject, and in addition to undertaking the revision of the code, it will publish engineering data involved in carrying out those code rules which concern the strength requirements for overhead conductors, wooden poles and steel tower supports, etc At the first general revision considerable material will be added to Part 2, dealing with overhead line construction, since this is the least complete part of the code as it now stands. In addition to expanding somewhat the scope of this part, it may also be rearranged in order to make it more easy of reference and application.

It is anticipated that any minor imperfections in the code will gradually be eliminated by revision, and that it will become eventually adopted and applied throughout the country, constituting a single national standard which will be universally accepted as representing the minimum requirement for construction and operation which can be regarded as good and safe practice.

Careless Use of Electricity Causes Many Fires

THE first accurate figures for the United States, or any other nation, of money losses on insured property, by causes of fires, based on payments by fire insurance companies, have been tabulated by the Actuarial Bureau of the National Board of Fire Underwriters. The statistics are for 1916 and, in that year, property valued at $16,559,433 was destroyed in the United States by electrical fires.

In its bulletin, "Safeguarding America Against Fire," the National Board of Fire Underwriters said: "Aside from 'exposure,' which was greatly enhanced by the several conflagrations of the year, the largest single item in fire losses was due to electricity, which caused a damage of $16,559,433. This was not chiefly because of defective wiring, switch boxes, etc., so much as because of the amazing carelessness of users of small electrical devices such as electric smoothing irons, hair curlers, plate warmers, etc. The actuarial bureau is in receipt of the particulars of a daily average of about 100 fires from this most inexcusable cause, and, as the figures prove, the total destruction is alarmingly high. It calls for corrective measures on the part of the authorities, while the companies manufacturing these devices, or supplying the current for their use, should take the leadership in an earnest educational campaign to reduce the danger. Electricity, while placed in the 'partly preventable' group, thus contains a very large percentage of strict preventability. Iowa and California show the largest proportion of loss from this cause, which produces more than 21 per cent of the total destruction in the former State, and nearly 14 per cent in the latter."

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Drinking Water Protection in Industrial Plants

AN adequate supply of pure drinking water, maintained at a temperature of about 50 degrees F., supplied at convenient locations by means of sanitary drinking fountains, is a necessity in every industrial plant. Furnishing drinking water at the proper temperature is important. If it be too cool, a man working under extreme heat conditions is liable to shock from drinking water at a low temperature.

A number of different cooling devices have been placed upon the market, some of which proved unsatisfactory because of unsanitary construction, and also for the reason that they could not be regulated to supply water at a desired temperature. The sanitary drinking fountain and cooler shown in Fig. 1, is a refrigerating fountain having an ice capacity of more than 50 pounds. A 40-foot coil is so arranged that the water is cooled by the time it can flow through the coil. It is furnished with a nickel-plated brass tulip bowl which also serves as a receptor, and the design and size of this bowl prevent the water from splashing the consumer while drinking. The icebox has double metal walls insulated with granulated cork. The self-closing bubbler has an adjustment whereby it can be made to flow continuously, and there is also attached a flow regulator which makes it adaptable to any pressure. This bubbler cooling fountain delivers the water at the desired temperature.

By far the most important feature, however, of a bubbling drinking fountain is whether or not it is germ-proof, and this is a feature of first consideration, because the life and health of every user is concerned. To properly appreciate the menace of unsanitary drinking fountains, we must consider wherein the danger lies. It is a singular fact that the most minute member of the animal kingdom, the microscopic germ of disease, is the most destructive foe of the most important member —mankind; and it is with the prevention of the spread of disease germs that we are concerned in the bubbling drinking fountain. The infinitesimal germ

Fig. 1

of disease, so small as to be entirely outside our normal vision, and which can be distinguished only under a high power microscope, is man's most deadly and relentless foe. Its ambition is the destruction of human beings, and, being without mercy, giving no quarter to its victims, it strives to accomplish on every occasion its mission of death. This, the most insignificant animal organism, has taken, and is taking a most

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terrible toll of destruction among human beings. Think of the countless deaths from tuberculosis, pneumonia, typhoid fever, scarlet fever, blood poisoning, diphtheria, and all the other terrible maladies due to the work of the disease germ! Owing to the fact that the deadly germs of disease cannot be seen, they are likely to be forgotten and their very insignificance and obscurity to our vision is their most formidable means of attack. When we see a danger clearly confronting us we act, because of the eternal impulse of self-preservation. We consider the tiger as a deadly foe, and wherever tigers are at large, shooting parties are organized and do not cease the hunt until all the tigers are slain. We can see the tiger and we recognize the fact immediately that this enemy and man cannot inhabit the same parts together. The existence of the one depends upon the destruction of the other, and man, having superior and more deadly means of destroying his enemy, loses no time in accomplishing his purpose.

The sum total of the loss of human life from all other hazards is infinitesimal compared to the stupendous destruction which has been accomplished by the microscopic germ of disease. The ferocity of the wild beasts is as nothing compared to the deadly earnestness with which the germs of tuberculosis, typhoid fever, diphtheria, blood poisoning, and other disease germs carry on their campaign every hour of the day and night, ceaslessly destroying human life.

The common drinking cup was proved to be a fruitful source of spreading communicable diseases; that is, the germs of diseases were found to lurk in the common drinking cup and so a healthy person innocently using the cup exposed himself to one or several diseases. Undoubtedly the common drinking cup has been the cause of countless deaths and illness before its use was prohibited.

The most sanitary and convenient method of furnishing drinking water to large numbers of people, such as workers in industrial plants, is the bubbling fountain. It is all-important that the design and operation of the bubbling fountain is such that germs of disease from an infected person who has used it, cannot come in contact with subsequent users, and that they be entirely removed from all parts of the fountain coming in contact with users. The bubbling drinking fountain came into use as a sanitary and convenient method of furnishing drinking water upon the abandonment of the dangerous common drinking cup, and if it does not accomplish the purpose of preventing the spread of communicable disease, it does not meet the most important requirement of furnishing drinking water.

Fig. 2

As was shown in the January issue of SAFETY ENGINEERING pages 20 and 21, several types of bubbling drinking fountains were investigated in May, 1917, by the United States Public Health Service and were condemned on the grounds that their design and operation could permit the communication of germs from one user to another. The germs of disease possess remarkable vitality and can exist under great variations of temperature, for instance, alike in the mouth of a person and also in cold water, and they thrive in liquids as well as on solid substances.

The problem confronting the industrial employer, is to furnish his employes with pure drinking water in such a manner that each can drink safely without the danger of contracting serious disease. Fig. 2 shows one of the latest types of sanitary bubblers. This bubbler is furnished with a screw by means of which the flow of water is

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regulated, so that the water may be caused to bubble at any desired height. A locking device holds the regulator in the position in which it is set. It will be noticed that there is no receptor around the bowl for the reason that a receptor is sometimes used as a cuspidor by men who desire to dispose of tobacco, etc., before using the drinking fountain. A cuspidor should be placed beside the fountain for this purpose.

When it is remembered that many of our most fatal diseases can be contracted from unsanitary methods of furnishing drinking water, its importance is one which calls for careful attention on the part of all those charged with safeguarding industrial workers and maintaining the efficiency of an industrial organization.

Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Keep the Men Busy

ONE of the most effective ways to get workmen interested in safety work, according to the best experience, is to give them some active part, such as an inspection committee to report on existing conditions.

New York Safety Council

A GENERAL meeting of the executive committee and members of the New York Local of the National Safety Council was held in the American Museum of Safety, New York, on Thursday evening, February 14. Through the courtesy of the museum, a complimentary buffet dinner was served under the efficient management of the New York Edison Company's Bureau of Home Economics, which was generously donated for the occasion. About 40 members of the local were in attendance and the business meeting and discussion of safety topics following the dinner were highly interesting and profitable.

It was decided to hold the next meeting at the museum on the evening of March 7. Dinner will be served and the topic for discussion will be "Safety Problems in Handling Materials and Supplies by Hand, Trucking and Piling."

It is proposed that, at future meeting, the discussions shall be confined to definite questions connected with practical safety work.

The meeting aroused much enthusiasm and augured well for the success of future sessions. In fact the drive is on to make the local council an active and aggressive organization in the cause of safety.

Chemical Company's Results

IN Bayonne, N. J., the National Chemical Company, employing 500 men, had just 148 hours lost during 1917. The total number of working hours of the plant for the year was 584,296.

What Experience Teaches

FIELD SECRETARY C. W. PRICE, of the National Safety Council, says that 10 years' experience reveals three outstanding facts with regard to safety work: That three-fourths of the deaths can be eliminated; that not more than one-third of the safety results in industries are accomplished by mechanical devices, two-thirds being due to the co-operation of foremen and the education of the employe; and that every company doing safety work finds it makes for efficiency, and turns out dividends and good business.

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Mr. Morgan Leaves Worcester

EARL B. MORGAN has resigned as safety engineer for the Norton Company, Worcester, to take the position of safety engineer with the Liberty Mutual Insurance Company of Boston, Mass. Mr. Morgan will assume his new duties March 1.

Mr. Morgan has been safety engineer for the Norton Company, in charge of

Earl B. Morgan

the safety engineering department, for a little over two years. Before coming to the Norton Company, he was safety engineer with the Commonwealth Steel Company of St. Louis, Mo., in charge of the safety engineering and employment departments. Previous to holding the position with the Commonwealth Steel Company, he was plants engineer at the same plant, and also plants engineer in charge of the construction work at the American Steel Foundries' Granite City plant.

Mr. Morgan is a member of the American Society of Mechanical Engineers; a director and member of the executive committee of the National Safety Council, and chairman of the Iron and Steel Section of the Council; a member of the Committee on Safety and Sanitation which drew up the safety code for the American Foundrymen's Association; also chairman of the Safety Committee of the Grinding Wheel Manufacturers of the United States and Canada. He was commissioned on special work by the Council for National Defense in connection with the Accident Prevention and Employment Survey conducted in all the Government navy yards and arsenals for the purpose of formulating a definite report for plans to be followed by the United States Compensation Commission. That work was done during the summer of 1917.

A Job for the Salesman

JAMES H. COLLINS, chief, Trade and Technical Press Association, United States Food Administration, has written a special article entitled, "Food Saving—A Job for the Salesman." Mr. Collins tells of the 40,000 traveling salesmen in the country who are co-operating to spread the gospel of food saving. Each man is a "message-bearer" to from 25 to 50 merchants each week. Each merchant is obviously a salesman himself and has from two to a dozen clerks at least, who are also salesmen. So each traveling salesman is a message-bearer to from 100 to 500 other salesmen weekly. In this way food saving has a sales force in the field which runs up into the millions.

Safe Fuel Oil Systems

FUEL oil that leaked into an underground flue and was ignited by fuel gases is believed to have caused a fire in a Providence, R. I., manufacturing plant. Safe fuel oil systems, installed according to underwriters' rules, afford protection against such dangers.

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Pennsylvania Safety Standards

AMONG the safety standards issued by the Industrial Board of the Pennsylvania Department of Labor and Industry are the following:

No. 1, Power Transmission.
No. 2, Standard Railings and Toe Boards.
No. 3, Stationery Steam Engines.
No. 4, Machine Tools.
No. 5, Forging and Stamping.
No. 6, Polishing and Grinding.
No. 7, Compressed Air.
No. 8, Woodworking Machinery.
No. 9, Bakeshops.
No. 10, Fire Prevention.
No. 11, Canneries.
No. 12, Boilers.
No. 13, Foundries.
No. 14, Ladders.
No. 15, Cereal Mills.
No. 16, Lighting.
No. 17, Elevators.
No. 18, Textiles (Not published).
No. 19, Explosives.
No. 20, Cranes.
No. 21, Electrical Code.
No. 22, Lead Corroding and Oxidizing.
No. 23, Paint Grinding.
No. 24, Dry Colors.
No. 25, Nitro and Amido Compounds.
No. 26, Brewing and Bottling.

Copies of the above may be obtained on application to William Lauder, secretary Industrial Board, Masonic Temple, Harrisburg, Pa.

"Safety First" Films

IN line with the campaign of the New York State Industrial Commission to promote "Safety First" and to prevent industrial accidents, the commission has made arrangements with leading film manufacturers whereby they will furnish to New York State industries the use of "Safety First" films, free of expense. Manufacturing corporations or concerns who are interested in securing these pictures may learn how to do so by communicating with Commissioner Louis Wiard at 230 Fifth avenue, New York City.

Song of the Fire Bug

COME one, come all, and see the fall of a house some good man built. I play my game with bomb and flame nor blush to own my guilt.

For I love still
The Kaiser Bill
And do his dirty work.
Within the dark
I set my spark
And never sleep nor shirk.

The sparks that creep
Where children sleep
Oft come from faulty flues
And do more dirt
And cause more hurt
Than nicotine or booze.

—*Exchange.*

Dangerous Machinery Code

INSTALLATION of a Dangerous Machinery Code in connection with the industries of New York State is near at hand, and initial work has been begun on the proposed new Mercantile Code. The final hearing on the machinery code was held in the rooms of the Bureau of Industrial Code, New York City, on January 15. When the code is finally revised into permanent form it will be presented to the Industrial Council and the Industrial Commission for approval. When they concur, the code will become law.

Wire Glass Rarely Blows Out

THE Halifax explosion broke all of the windows in all of the buildings of the Dominion Textile Company's cotton mill and the mill was totally destroyed by fire. A report issued by the Boston Manufacturers Mutual Fire Insurance Company says: "As all of the windows were blown out and cotton was strewn about the rooms and even festooned over the pipes and shafting by the force of the explosion, fire quickly traveled the whole length of the top story." If sparks entered the building through the unprotected window openings, wire glass windows might have saved the property.

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Fire Prevention for "Movies"

LAWS passed by the 1917 legislature regulating motion picture theaters have been put into effect by John B. Sanborn, State fire marshal of Minnesota. It is now unlawful for any person to operate a motion picture machine, or to exhibit motion pictures in any theater, hall, or building where the public is admitted, without a license. The licenses are issued by the State fire marshal only after the "movie" theater is thoroughly inspected by the department, and conforms to a number of rigid requirements. The booth in which the projecting machine is installed must be of fire resisting material, and constructed in accordance with specifications outlined in the laws. The law provides for experienced operators of such machines, who must be over 18 years of age and who in the judgment of the deputy inspecting the theater, are qualified to operate the machines. The number and location of exits, which must be properly marked and illuminated with red lights, also the location and condition of hand extinguishers and other inside fire protection, are provided for.

Mine Bureau Bulletins in Press

THE United States Bureau of Mines has in press the following named subjects: No. 231. Mortality from respiratory diseases in dusty trades. No. 234. Accidents and accident prevention in the iron and steel industry. No. 236. Effect of the pneumatic hammer on the health of stone cutters in the Indiana Oolitic Limestone Belt.

Harvester Company's Record

SAFETY work was started by the International Harvester Company at its steel plant in Wisconsin in 1910. In that year 4 men were killed and 59 injured in the plant; the following year only one man was killed and 19 seriously injured. Since the introduction of safety work the death and accident rate has been reduced 88 per cent.

Townsend's Own Fire Drill

E. R. TOWNSEND, fire protection engineer, has a regular fire drill in his home in Edgewater, Ill. When he gives the alarm the Townsend youngster runs directly to his father, the mother goes to the telephone to turn in the alarm, and the maid starts for the fire alarm box. Each member of the household has his precise duties with regard to the chemical fire extinguisher, the pail of sand, and the ladder which compose the home fire-fighting devices. Alarms have sometimes been given at night after the boy was in bed, but he has responded promptly and Mr. Townsend believes he would be sure of the safety of his family in case of a real fire, and would be able to extinguish it or get help more quickly because of organized action.

Irritations Caused by Dust

THERE are but few manufacturing establishments outside of machine and boiler shops, says Howard L. Boyd, that do not make fumes or dust. Mattress factories, paint factories, planing mills, paper mills, cotton mills, electroplating establishments, even the garment factories, create dust, often of a poisonous nature. All these fill the air with minute particles of solid matter, which, when breathed for varying lengths of time, produce several ailments from irritation.

War Gases and Gas Masks

BECAUSE of the experience gained in the study of the origin of poisonous gases in mines, the methods of combating such gases and the various types of protective apparatus used for rescue and recovery work in bad air, the chemical and mining divisions of the Bureau of Mines are working in co-operation with the War and Navy Departments in investigating the gases and gas masks used in war. This work, which has assumed extensive proportions, is under the direction of G. A. Burrell, chemical engineer.

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Training for the Girls

THE Ellsworth Collieries Company offers to the girls in its employ an opportunity to train themselves in the science of home making. The classes have been composed mostly of daughters of non-English-speaking parents, and the work has been made as practicable as possible in its character. Special attention has been given to the working out of well-balanced menus, to the value of foods in a general way, to American methods of cooking, and to approved household practices. Food conservation has been emphasized, and lessons in packing of dinner pails and luncheons included. Sanitary conditions in the home, the open window in the bedroom, and the inadvisability of "herding" a number of boarders in a home, have all formed part of the instruction.

Accidents at Street Intersections

IN his twelfth safety bulletin, City Magistrate Frederick B. House, of the Traffic Court, New York, warned drivers not to make "short cuts," saying: "Accidents occur frequently at street intersections. The ordinances are plain. In turning to the right into another street the turn should be made as near the curb as practicable. In turning to the left into another street the vehicle should first pass to the right and beyond the center of the street intersections."

Poisonous Exhaust Gases

SEVERAL deaths have been reported as having been caused by gases discharged by the exhaust pipe of internal combustion engines. In certain cases the victims had kept the engine of their automobile running while the car was in a small garage whose doors were closed. These accidents call renewed attention to the poisonous character of exhaust gases, and should serve as a warning to all car owners. Incidentally they emphasize the danger of using the exhaust gases for heating purposes, as is done in some public conveyances. Unless extreme care is exercised a leakage of gas is liable to occur with a consequent exposure of passengers to the poisonous gases. The matter is now under investigation by the sanitary bureau of New York City.

Straw Hats as Head Protectors

ONE of the United Gas Improvement Company's engineers suggests wearing straw hats with stiff brims for those employed in and around electrical stations. It seems that the straw hat is far superior to a felt hat from the safety standpoint, for should your head come accidentally in contact with live wires, the rim of the hat or the crown prevents injury and gives the necessary warning. The same holds good when working around steampipes.

In a recent serious accident, where a man unconsciously came in contact with a 13,000-volt line, due to its being slightly above the line of vision, he would have been protected had he worn a straw instead of a felt hat.

Some are apt to ridicule the suggestion of wearing straw hats in zero weather, but it is probable that the need for instruction among that class is very great. If a straw hat lessens the risk of losing one's head it should be worn regardless of ridicule. Also let it be remembered that things are often very successfully adapted to uses for which they were not originally designed. For example, wire glass was not brought out as a fire retardant. Why not make a safety "helmet" of the stiff-brimmed straw hat?

Safety Success in Omaha

IN a plant where the hazards are above the average, one Omaha company, with 1,000 employes, mostly foreigners, reduced time lost and accidents 90 per cent in one year, by the application of safety principles. No employe lost 24 hours' time through injury in four months.

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Training for Efficiency

THE Cleveland-Cliffs Iron Company, a few years ago, instituted a definite provision for the training of men in its organization to a higher level of mental capacity and efficiency, by giving an opportunity to its employes to take up courses of study, that should be directly useful and also deal primarily with the mining of iron ore. Announcement was made that, so far as possible, all the men chosen for shift bosses would be taken from the classes, which gave the men an incentive, and assisted in overcoming any existing prejudice, since it was evident that the employes would benefit from the training. Some of the topics discussed were: Safe methods of blasting down timber; Methods of thawing dynamite; Use of delay-action fuses in shaft sinking; Choice of explosives for different character of ore and rock; Inspection and lubrication of hoisting ropes; Testing of safety catches on cages; Underground sanitation; Ventilation of metal mines; Methods of procedure at mine fires; Treatment of a man overcome by powder smoke, and other first-aid problems; and the workmen's compensation law. The work done in training the men for positions of higher responsibility was gratifying, and resulted in greater efficiency and reliability on the part of the men, and in making the company independent of outside help, because there was within its own organization the trained brains necessary for high efficiency.

Safety and Frozen Pipes

IF it is found, on a cold morning, that the water is frozen in the pipes or in the water-back of the kitchen range, the *Travelers Standard* offers this advice: Be sure to thaw out the pipes before starting up the fire in the water heater or range, otherwise an explosion may occur. Open the faucets at the kitchen sink or in the bath room, and thaw out the pipes by the application of a gentle heat at the point where it seems likely that the ice has formed. This may be done quite safely by wrapping the pipes with cloths wrung out in hot water, and frequently renewed. Another method, which is usually less tedious, consists in applying hot flat-irons to the pipes,—electric irons being preferable, because they may be kept hot continuously. Lamps, plumbers' torches, and other open flames should never be used, on account of the danger of fire. The fire in the heater should never be started until the water flows freely from the faucets.

Objects of Corporation School

PERHAPS the best example of correlation between industry and education, says E. E. Bach, is what is known as the Corporation School, organized for the purpose of giving special training to employes of large industries. Its object is: "To bring into one cohesive organization all of the large industrial institutions of the United States and through this organization prosecute vigorous activities to the end that the problems of waste, through unnecessary labor-turnover, waste through lack of proper training, waste through unnecessary sickness and accidents, may be minimized and, where possible, eradicated."

Cracked Cylinders Were Costly

WHEN the Parkway Baths and other buildings, Coney Island, were burned in November, 1917, a little difficulty was experienced in the high pressure pumping plant. The plant consists of three Gould triplex double-acting vertical pumps, each designed to deliver 1,500 gallons per minute at 150-pound pressure. Each pump is driven by a 3-cylinder, 4-cycle 175 H.P. Nash gas engine. One cylinder on each of the two engines, namely Nos. 2 and 3, had a crack between the inlet and outlet port, also water jacket. When the cylinders were heated these cracks opened slightly, apparently allowing the hot gases to fire the inlet gas charge which caused backfiring; also the cooling water may have short cir-

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cuited the spark plugs. Engine No. 1 ran continuously throughout the period of the fire, but with the exception of about 44 minutes there were only two pumps in operation during the fire. These details are given in a report by the New York Board of Fire Underwriters.

Huntington Safety Council

THE smallest city to have a safety council affiliated with the National Council is Huntington, W. Va., which established such an organization in January after a vigorous campaign conducted by Field Secretary C. W. Price of the national organization. The idea was received enthusiastically in Huntington, a large number of industrial plants and other companies applying for membership. At a meeting of superintendents, managers and foremen held on January 10 to perfect the organization, John W. Ensign of the American Car & Foundry Company, was elected president. Mr. Price gave an address explaining what is attempted by the Safety Council, and mentioning some of the results secured by men active in safety work. The audience was interested in the subject and asked a number of questions.

Safety Devices and Standards

IT has been the policy of the Compensation Inspection Rating Board of New York, Secretary Senior says, to be guided very closely by the standards of safety established by the engineering committees. This does not mean that in our comparisons of safety devices we have applied inexorable interpretations with absolute and rigid conformity as to height, distance and size. No safety device, however, is approved unless it substantially does conform to the adopted standards. The inspectors of the board are required to report for individual attention each specific case where the guard or device shows a slight deviation from the standards. It is true that at times criticism has been leveled at this board on account of its attitude with respect to close adherence to safety standards. Notwithstanding such criticism, we entertain the belief that our general policy has been correct and in the main beneficial to the employes of this State. There exists so much diversity of opinion regarding what may be termed safe conditions in factories, that compliance with definite standards of safety agreed upon by the engineering talent is desirable, not only for the purpose of maintaining uniformity in rates, but to attain the ultimate object of preventing accidents.

Extinguishing Fires at Oil Wells

FIRES at oil wells and storage plants are being studied by C. P. Bowie, petroleum engineer of the United States Bureau of Mines, and a technical paper is being prepared which will describe the various methods used throughout the oil fields of this country for preventing and extinguishing such fires. Fires caused a loss of over 2,000,000 barrels in the Oklahoma fields alone during 1915. The paper will present many ideas in advance of general practice, it is asserted.

Pennsylvania's Fires in 1917

THE fire record of the Pennsylvania Railroad System for 1917 shows the low loss ratio of 8½ cents for $100 value at risk, and illustrates the value of training employes in fire fighting methods, of organizing fire brigades and of providing modern fire extinguishing apparatus. The first brigades extinguished 66 fires on property having a total value of $6,310,574, the entire loss sustained being less than $59 per fire. Chemical extinguishers checked 30 fires on property worth $197,156 with total loss of $630. Fire pails were used 53 times on property worth $664,622, at a loss of $1,292; locomotive fire apparatus was used in 19 cases, with loss of $1,176 on property worth $332,420. Water casks and fire pails extinguished 23 fires on

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property worth $290,167, with loss of $800. Chemical engines proved their worth in 4 fires by keeping down losses to $630 on property valued at $942,640.

The Poisons of Their Occupations

DURING the year 1916 there were reported to the Industrial Accident Commission of California no less than 348 cases of occupational diseases in California, including: Lead poisoning, 43; cement poisoning, 15; sugar poisoning, 37; hop infection (this does not mean beverages), 99; triton poisoning, 20; infections from handling soiled linen, 3; from handling chemicals, 4; dye poisoning, 2; mercurial poisoning, 7; anthrax, 8.

These and many others show the relative liability of workers in the various industries to the peculiar poison of their occupations.

Highway Accidents Increase

TRAFFIC accidents in New York State for 1917 were summarized in a statement issued January 1, in advance of the detailed annual report, by Colonel Edward S. Cornell, secretary of the National Highways Protective Association.

During the last year 837 persons were killed in New York State by vehicular traffic. The record for 1916 was 729, and a comparison with the 455 killed in 1912 shows an approximate increase in fatalities in New York of 84 per cent in five years. At railroad grade crossings the year's fatalities were 90, compared with 82 in 1916, 122 in 1915 and 107 in 1912.

Mr. Trego's New Position

FRANK H. TREGO, treasurer of the Stonehouse Steel Sign Company, Denver, Colo., since its organization in 1914, has severed his connection with that company and goes to the Mine Safety Appliances Company, Pittsburgh, to act as manager of that company's industrial and sign department.

Frank H. Trego

J. W. Stonehouse, head of the company bearing his name, pays a high tribute to Mr. Trego's services, not only to the corporation whose employ he now leaves, but also to the safety movement in general. Mr. Trego has made a careful study of the safety movement and is considered an authority in the matter of safety signs.

Incidentally, Mr. Trego has been the winner of one first prize and one second prize, and has received honorable mention several times in SAFETY ENGINEERING'S "Man On The Job" contests.

Falling Object Hazard

A MANUFACTURING plant's safety bulletin shows a picture of a factory building with loose bricks on the edge of the roof and offers these comments: "Loose bricks as shown on the edge of the roof in this illustration could fall on a passerby and cause a serious injury. The falling object hazard should be considered at all times."

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 330 VARIOUS INDUSTRIES—SPREADING OF FIRE. — The writer has in mind plants engaged in manufacturing paints, greases, lubricating compounds and such products which are highly inflammable, yet not of an explosive nature, and extinguishable by means of foam. Such plants are equipped with numerous small kettles and tanks, having a capacity of from one to 20 or more barrels, for the purpose of mixing and compounding. These kettles and tanks are operated under the charge of one man for five or more kettles, as little attention is required during this process. For this reason only one or two men are engaged on a floor of considerable area. For fire protection, the up-to-date plants use portable foam fire extinguishers, which are most effective for the purpose. The extinguishers are distributed throughout the building, in accordance with fire underwriters,' State or municipal requirements.

In case of fire, the man in charge is to use the nearest portable extinguisher (provided the man is on the floor at the time). This however is rarely possible, as the flames from the blazing kettle do not permit the man to approach near enough to make the extinguisher effective.

Further, it often happens that the fire will generate heat with such rapidity that it is impossible to stay within the room, much less to approach the blazing tank with an extinguisher and stand near enough to the tank to permit the extinguisher to empty its contents.

The consequence is, of course, that the adjoining tanks catch fire and seriously damage, if not destroy the structure housing them, before the fire department has an opportunity to respond.

The writer's personal knowledge of such a case leads him to the idea herein described.

Automatic sprinklers are now being used with the greatest dependency and satisfaction. These, however, would not be effective for such fires as described above since water has little effect on oil fires.

The fusible link idea of releasing sprinkler heads could, however, be applied with great advantage, in connection with foam fire extinguishers in the following manner:

Support the foam fire extinguisher of sufficient capacity on a bracket immediately over tank to be protected, in such a way that it will not interfere with the routine work or mechanical equipment.

The bracket is to be made of cast iron and attached to tank, or wall or ceiling of building. A trunnion clamp is to be fastened around extinguisher, about one third its height from the bottom, the two trunnions are to be set into the bearings provided in the bracket.

The top of the extinguisher is to be held in a vertical, slightly forward position, by means of wire or chain, in which a fusible link is inserted. The slightly forward position is essential as the vertical axis of the extinguisher must be off dead center.

At the instant the temperature rises above the fusion point of the supporting link, due to fire, the link releases the extinguisher, which automatically inverts, by reason of the inclination forward and two thirds of the weight being above the point of support. The inverted extinguisher acts at once, discharging the fire smothering contents in the state of foam. This method would be most positive in arresting small oil fires, before

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they become uncontrollable. The Foamite Fire Extinguisher Company, and the M. H. Treadwell Company, which manufacture automatic foam fire extinguishing equipments for large oil storage tanks, would doubtless take sufficient interest in this matter to put such brackets on the market, in connection with their portable foam fire extinguishers.

While the installation of one extinguisher for each kettle or tank would increase the number of extinguishers now on hand in such plants, the additional expenditure would be well made considering the reduced fire risk attained, and the satisfaction of being certain that the extinguishers will "do their bit."

This protection should receive special consideration during the present times, especially where war orders are to be filled, when the loss of the plant would not only be the loss of the owners, but also a loss to the Nation.

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No. 331 THE MILLMAN.—You seem to have slighted the mill man. I mean the rolling and puddle mill hands. You know they are a reckless lot, but human, and they need to be safeguarded. Take for instance uneven plates on the floor. I have seen roughers and stickins using wire to hold separators on spindles, fall with white hot bars going over them, burning them severely, causing death. I helped to take a man from a spindle whose jacket had caught in the wire—which he himself used to hold the separators—and wrapped him around between the coupling boxes, crushing his head and breaking every bone in his body. In place of the wire, he should have used a spring specially constructed for this purpose.

I have seen cases of rollers using their hands in replacing guides while the mill was in operation. "Caught." Results: Loss of hand in one case, in another an arm. They have tongs they can use. Why not use them? Too much time lost. I know they are for "Safety First," but lack the initiative.

I have often been approached, "Hey you 'Safety First' man, what do you think of this, is this safety, is that 'Safety First'?" What I do is to explain to them, that by acting in conjunction with us we can make it safe, and we are willing to take any suggestions they have to offer, then make an earnest endeavor to do it. You must be on the job, not "hot airing" it.

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No. 332 INDUSTRIAL FIRST AID INSTRUCTION.—It is a matter of common knowledge that a large number of accidents of greater or less severity occur annually in the industries of the United States. Formidable accident figures have no doubt greatly increased since the war started, for the introduction of new labor and of employes unaccustomed to the work, particularly in conjunction with the need for speed and pressure, overtime and night work, with the consequent fatigue, have inevitably led to greater risk of accident and injury.

Statistics are sufficient evidence to point to the urgent necessity and value of first aid equipment and instruction. Training in the essentials of first aid of a sufficient number of workers should be insisted upon in all industries, in order that there may be at least one or two persons who know how to render efficient first aid in case of injury, and to see that all first aid work is done by a fully qualified person.

The necessity of first aid training in industries where there is any element of risk has been proved to the hilt over and over again; and it is a source of satisfaction to know that most employers realize the day is past for condoning slovenly or inadequate provisions for the care of the injured.

All industries should receive instruction as to the proper steps to be taken on the occurrence of accidents, and suitable arrangements should be made for the effective organization of means of emergency treatment. In this treatment lies true economy of the industrial power of the Nation, and it is no less than a humanitarian obligation that where employes are exposed to risk of injuries, some of their number should receive the instruction which will qualify them to

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render timely and efficient assistance to their comrades when the need arises.

[*The First Aid Division of the American Red Cross employs a staff of field representatives trained and experienced in first aid to the injured and accident prevention work who are loaned, under mutually agreeable conditions, to railroads, telephone companies, manufactories, mines, lumber mills, quarries, ship yards and similar industries for the purpose of instructing the employes in first aid to the injured and accident prevention. Information regarding available dates and other data will be mailed upon application to the First Aid Division, American Red Cross, Washington, D. C.*]

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No. 333 USE OF GOGGLES.—The following is submitted for guidance relative to the class of work requiring men to wear goggles for the protection of their eyes, especially for workers in steel plants; also many other shops:

All Departments—Chipping iron, steel and other metals; grinding on emery wheels; pouring babbitt metals.

Open Hearths—Steel tappers; steel pourers and helpers; removing caps from molds; charging machine operators; cinder men.

Blooming Mills—Roughers at rolls; soaking pit cranemen.

Carpenter Shop—Turning on wood lathes; grinding on grindstones.

Gas Producers—Firemen when opening poke holes; handling ashes; breaking coal.

Machine Shop—Chipping iron, steel, etc.; grinding on emery wheels; dressing emery wheels and grindstones; pouring babbitt or other molten metals; machining tool steel, cast iron and brass when not using a chip guard; grinding on grindstones; working on lathes and shapers.

Roll Shop—Grinding and chipping rolls; grinding on emery wheels or grindstones.

Blacksmith Shop—Chipping and grinding; grinding on grindstones.

Structural Shop—Chipping and grinding; oxy-acetylene welding and cutting.

Electrical—Switch work and putting in fuses; soldering joints; blowing out generators and motors; cleaning arc lamps.

Boiler House — Replacing gauge glasses; chipping brick walls; chipping scale from drums; dumping ashes; cleaning under boilers; breaking coal; unloading coal from cars.

Yard and Miscellaneous — Masonry work; chipping concrete, brick, stone, etc.; oxy-acetylene welding and cutting; painting stacks; whitewashing; work in dusty and dirty places; when breaking large scraps, etc.

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No. 334 PREVENTION AND TREATMENT OF EYE INJURIES IN A SHIPYARD.—The prevention of eye injuries in a shipyard forms a major part in the daily routine of the safety engineer and hospital attendants. The writer's personal average of eye injuries treated during the past two years consists of ten a day. These injuries are of the following types: Foreign body in the eye, steel; foreign body in the eye, cast iron; foreign body in the eye, coke; foreign body in the eye, wood, and foreign body in the eye, glass. Another type of injury that causes a great amount of trouble is laceration of the eye, caused by the glass lenses in safety goggles being smashed by steel dies and chisels from the air guns. Burns of the eye are caused by hot chips from the rivets; hot pieces of metal from the furnace and lime splashing in the eye in the labor department.

In order to prevent eye injuries, it is absolutely necessary to have the cooperation of the workmen, safety engineer and hospital attendants. Having employed the following method and found it successful, as the records prove, the writer here outlines it for the benefit of other safety workers.

First, try to ascertain the proper kind of eye protectors for the different kinds of work. One type of goggle might answer the purpose for chippers and caulkers, and not be satisfactory for reamers and riveters. Endeavor to purchase a goggle whose construction is light and firm, so as not to irritate the nose or head of the workmen. A goggle that will not steam in cold weather is the ideal one to increase production in such weather. It may be necessary to experi-

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ment with a dozen pairs of glasses, but in the end the results will be satisfactory. It is always a good plan to listen to the suggestions the workmen have to make regarding the qualities of a goggle.

The writer has found from his personal experience that the treatment of eye injuries is the important part of his daily life in the shipyard hospital. The most essential help is to have a good eye specialist employed by the company to take charge of all serious cases. Next, to have a first class set of instruments, a good light, a supply of eye solutions and plenty of ointments, as for burns of the eye; a good supply of local anesthetics, and a stock of eye patches, to be distributed when necessary.

As a final suggestion, have the hospital attendants bear in mind always the great importance of having all instruments and cotton aseptic when treating an eye injury.

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No. 335 SUGGESTIONS FOR "SAFETY FIRST."—It may interest some to know of a system my company has had in mind for some time, although it is not in operation. I have observed that considerable stress has been laid on the education of the worker, due to the large percentage of accidents which are due to the man himself or his co-workers. Our experience coincides exactly with this view, and I do not wish to minimize that side of the safety question in mentioning mechanical safeguards.

In the steel industry, as in perhaps few others, the safeguarding of machines prevents a large number of serious accidents. In our case, minor accidents to hands and feet in handling material constitute numerically the greatest share, but I think our experience bears out the statement that when we have an accident with a machine it is a serious one. Mechanical safeguards, therefore, play an important part in maintaining a good accident record.

The best plan that we know of is to paint the guards on machines a bright yellow. The objection to this color is that it must be renewed often, but it offers, when the paint is in condition, a distinctive object, and in our plant the color has become associated with safety through our large signs, which have a yellow background. The machine guards when painted yellow are conspicuously noticeable when out of position, and are not so likely to be displaced. Our jib-cranes swinging from the wall and from pillars are painted this color to render them visible to the crane operators against the dull background of the shop, avoiding collisions of the crane falls with these jibs.

It has seemed to us that we would profit by a periodical inspection of the plant by a man from the mechanical department (in some plants he might be from the safety department). He would be equipped with a questionnaire covering every safety device that we have record of as having been recommended by the safety committee; a list of points covering condition of buildings, such as ladders, stairs, floors, floor openings; of machines, such as gears, chains, brakes, and such points as would constitute a menace by breakdown. The points in this report which demand action should be underscored by the mechanical superintendent and forwarded to the manager of the works with a memorandum stating the action on such points taken by the mechanical department. If the report contains matters which should be taken up with the shop superintendent, this should be promptly done.

Our experience has been that the one best way to get foremen and workers interested in safety is for the chief executive of the works to show that he is interested in it, and for him to take the time to consider the details of the operation of those things that the men have advocated through the safety committee. It is not encouraging for a man to recommend a guard or a revised practice, and after it is installed to see it gradually grow into disuse. It is different, however, when the manager steps in and orders such a thing replaced.

I have often felt that if all the guards were in operation that had been installed in past years we should have a pretty safe plant. Our task, therefore, is to retain such guards and practices as have been adopted and found practical.

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No. 336 TEAM WORK.—Every accident is an indication that something is wrong with men or methods. The men in the majority of cases are either careless or reckless.

It requires teaching by the foremen and the safety department to bring about the desired results, which may be accomplished by constantly reminding and interesting the men in safety.

It has often been said that the best safeguard is a "Careful Man," and it is necessary that the men make the word "Carefulness" their watchword and think before they act. The word "think" is the most important one in the safety dictionary. When a man is injured, he and his family are the losers, for the bread-winner is removed from the working roll and placed on the injured list, which means a reduction in his income.

Every workman should be approached through the medium of "Safety Talks" in the shop. These will ultimately lead to their co-operating with the safety movement, and they will become accident preventionists through team work.

Let us all put team work into our safety propaganda and make the plant a safe one. IT CAN BE DONE. Team work and co-operation will do it, if every one does his bit.

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No. 337 THE SAFETY KNOCKER.—Somebody once said, "There are two sides to every question," and an argument can be started about almost anything, be that argument intelligent or not. What we need, especially on the safety question, where groups of men are present, is less bigoted argument and more intelligent discussion. Furthermore, in this talk of unsafe practices, it is not necessary to make the air blue regarding the actions of a man at work—a little personal missionary work on the part of one of his friends will accomplish more, without inciting anger and resultant stubbornness. In all this talk of unsafe conditions, a little time will frequently correct them. If not, mention to the foreman in charge will usually result in swift remedy, if he deserves to bear the name of a real foreman.

But among any group of men, regardless of occupation, will always be found some whose chief aim in life is to criticize without seeking or finding a remedy of any kind—the "knocker," in other words. His attitude is that of the old dyspeptic in one of the *Saturday Evening Post's* stories, who, when the noon whistles blew, said: "Well, I am going home to dinner. If dinner is ready I ain't going to eat a bite; and if dinner ain't ready, I am going to raise Hell." The knocker's attitude, too, due largely to ignorance (and on account of this is his intolerance) is fatalistic, and leads to the hospital or cemetery. Such a man often is endured, yet those who associate with him scarcely realize at times his subconscious influence, especially on the young and inexperienced worker. Sad to relate, too, he is often a trained man who has been on the job a long time, and should know better. One of the striking and pleasant things about the average American small town is that any citizen is very quick to assail the visiting "knocker," either verbally or physically —in other words such is eliminated. Why not such a condition in the shop, where the degree of personal hazard is often multiplied by high-speed machinery? As one man's work often depends upon the excellency of another's, just so may one man's safety depend upon the care of those about him. So long as men are human and nature is fallible, mistakes will be made, and no human institution can be pronounced perfect. The individual worker, in the shop or out, should be constructive in his ideas rather than destructive. A tree can be cut down in 30 minutes which has taken 30 years to grow; if it is necessary to cut that tree it should be put to a more useful purpose than simple destruction. A safety organization can be seriously hampered by one carping critic; he has no place in it, unless his mental attitude can be changed. As men are overgrown children, just so will ridicule often silence one's baseless theories; at least, lack of sympathy plainly shown and no attention, will, as a rule, put a muffler on his mental delirium. If these fail, a policy to meet an individual case or condition may be necessary.

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The phrase "Be a Booster" is more than a short epigram; it is a mental tonic for those who live by it, a cheerful attitude towards life leading to happiness, especially true along the safety line. America is too good a country for the knocker who mistakes freedom of speech for unlimited license. Just so is the safety question too fine an institution, too necessary for industrial welfare, to admit of enemies within its ranks. Hence the prescription for the safety knocker is a barrage fire from men—intelligent men—who believe and practice the creed, "the safe way is the only way."

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No. 338 SAFETY AND CONSERVATION OF MAN-POWER.—A great many men forget that safety in the factory and shop "back home" is the finest kind of patriotism. While some men lack the mentality to appreciate what a fine country this is, and its urgent need for them at this crucial time, most will fully realize the basic truth of the above sentence. The man who does not can but plead "Not guilty" to the use of his brain-cells.

There are many men needed in the game of war behind the firing line; men whose serious duty it is to apply the best that within them lies for the efficiency of the men in the trenches. Because the Russian soldiers did not get the support from necessary bases, because they did not get food and ammunition, they were ruthlessly and helplessly slaughtered by the Hun droves. Because England was not quite prepared for the fangs of the wolf, her sons, especially the gallant Canadians, met to a large degree, needless death, but in a way which will ever justify their far-flung courage.

"What will America do" is the living, vital question before the Parliament of civilized mankind today. How soon will this country be a factor in checking wholesale murder in the name of power and arrogant brutality in the name of military expediency? In this vast melting pot of destruction, we must meet men with men, explosive with explosive and ship against submarine. Does the worker in the shop, the factory, the railroad, the sawmill and logging-camp, the other varied industries, realize his personal responsibility as does the man with the rifle, the flier in the air, the gunner on a fighting ship, and the sailor who goes down to the sea? War is a situation where one side seeks to inflict maximum loss on the other side with minimum destruction to its own forces.

The signs are on the door of industry, the same as in the trenches, that "those who run may read." They tell us that man-power will swing the red tide for us or against us. Will the men at the front pay a heavier price because the men at home are careless or seek to put petty personal issues ahead of great national needs? The answer lies in conservation of all available man-power at home, in the self-realized obligation of every man to do the duty before him. This has to do with every man's loyalty to the safety side of industry, which, considered in the above light, is his country's side as well. It has been figured that for every available man in the trenches, three must back him up immediately behind the line and that twelve must labor at home. Let any one of these men, even though distantly removed from "the far-flung battle line" be slaughtered through personal carelessness or unsafe conditions, and an asset is removed from a mighty machine mutually dependent upon all its parts.

To sum up, the individual worker at home must adopt something like this for his creed, if he expects to "carry on":

"I will be a safe man because I believe in commonsense practices.

"I will be a safe man because my family needs me more than ever.

"I will be a safe man as an example to the other fellow who must learn that the right way is the safe way.

"I will be a safe man because it is better for all that I be 'The Man On The Job' in the shop instead of a cripple.

"I will be a safe man because my brother in the trenches expects me to be ever able to back him up at home.

"I will be a safe man, because as an injured man I am a national ward; as a worker able to do, I am a national asset.

"I will be a safe man because man-power will win this war; I will contribute my time and skill to that purpose. In saving my country, I am saving myself."

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Prizes for January Articles

First Prize. No. 325. W. N. Lipscomb, Field Representative, American Red Cross, Crockett, Texas.

Second Prize. No. 326. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Honorable Mention. No. 329. R. J. Lauder, Safety Director, Consolidation Coal Company, Jenkins, Ky.

Other meritorious articles were contributed by A. J. Lamie, Safety Engineer, Ocean Accident and Guarantee Corporation, Ltd., Milwaukee, Wis., and W. N. Lipscomb, Field Representative, American Red Cross, Crockett, Texas.

Comments by Members of the Committee

Please credit article 326, January number, with my vote. It is general and hits important parts of the safety business.

One of the most important duties of a safety inspector is to educate the men not to trifle with minor injuries and to have them dressed immediately by a competent person. I think this subject has been ably explained in article 325, January number, and that 327 is a close second.

I have selected as my choice article 325, advocating "quick action and careful forethought" to avoid unnecessary trouble in our misfortunes. My slogan is, "An ounce of prevention is worth a pound of cure."

No. 325 discusses a condition of the utmost importance, though dealing rather with the question of minimizing the results of small accidents than of preventing them. In connection with safety work, however, it is a very serious matter. My experience is that one can gradually educate men, to a large degree, to applying for first aid even for small injuries, far more so than at first seems probable. Unfortunately, however, there are a number of men who will not take care of a small injury after that attention has been given, who will rip a bandage off or throw away a finger stall, who think it childish to make so much fuss "over nothing."

My particular reason for favoring 325 is that the writer calls to our attention, very forcibly, the fact that the little injuries are just as important as the big ones and if we take care of the little things we will have no trouble with the larger ones. I wish to compliment the writer of this article and trust that the readers of SAFETY ENGINEERING will derive a great deal of benefit from this article.

I cast my vote for No. 325. My experience has been that the net gain from prevention of accidents by all the various means is decreased to an astounding degree by the volunteer efforts of the "home talent" first aid man, who is ever ready and anxious to try his skill.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

BAKERIES AND CANDY FACTORIES

December 12, 1917. Buffalo, N. Y. Henry J. Walz Company, Inc. Huron and Oak streets. Bakers' supplies; other tenants in building. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in 2nd story. Discovered by citizen about 6:48 a. m. Alarm, from fire alarm station. Duration, 3 hours. Stopped on same floor where it started. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Property loss, $75,000. All valuable papers were kept on ground floor where there was no fire.

CEMENT, TILE AND OTHER KILN INDUSTRIES

December 17, 1917. Des Moines, Iowa. Shackleford Brick Company. Northern part of city. Manufacturing brick and tile. One-story sheds covering more than an acre of ground destroyed. Walls, brick and wood. Floors, earth. Roofs, wood. Cause, unknown. Fire started in dry sheds. Discovered by employe about 4:43 p. m. Alarm, telephone. Duration, 4 hours. Stopped after destroying dry sheds. Fire was favored by wood construction and no private fire-fighting equipment. Firemen handicapped by lack of water and isolated location of plant. Nearest fire hydrant 3,000 feet distant. Persons in building, none. Means of escape, 1-story sheds only. Value of buildings and contents, $145,000. Property loss, $70,500.

CHURCHES

December 16, 1917. Denver, Colo. Church of the Ascension. Gilpin street and East Sixth avenue. Episcopal church. One 1-story building damaged. Walls, brick. Floors, wood. Roofs, wood shingles. Cause, hot ashes in furnace room. Fire started in furnace room in basement. Discovered by passersby about 4:10 a. m. Alarm, telephone. Fire started under organ and burned about half way along the roof toward the front of the building. Fire was favored by covering of 3/8-inch ceiling on rafters. Persons in building, none. Means of escape, front and rear entrances. Property loss, $5,000.

December 20, 1917. Grundy Center, Iowa. First Baptist Church. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in basement. Discovered by persons attending prayer meeting about 7:10 p. m. Alarm, fire whistle. Duration, 1½ hours. Fire was somewhat retarded by brick walls. Firemen handicapped by low water pressure. Persons in building, about 12. Means of escape, ordinary exits. Value of building and contents, $25,000.

December 30, 1917. Pepperell, Mass. First Parish Church. Park street. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, defective chimney. Fire started near chimney. Discovered about noon. Alarm, church bell and local alarm system. Duration, 2 hours. Stopped at 1st story. Fire was favored as it spread immediately into blind attic and steeple. Firemen handicapped by intense cold—4 degrees below zero. Persons in building, 15. Means of escape, usual exits. Value of building and contents, $10,000. Property loss, $7,000.

December 30, 1917. Glace Bay, N. S. Roman Catholic church and 2 other buildings. Upper Main Street. Three 1- and 2-story buildings destroyed. Walls, plaster and sheathing wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in church. Discovered by janitor, about 7:30 a. m. Alarm, telephone. Duration, 7 hours. Stopped at convent building. Firemen handicapped by gale of wind, deep snow and low water pressure. Persons in building, none. Means of escape, ordinary doors. Property loss, $100,000.

CONFLAGRATIONS

December 12, 1917. Attleboro, Mass. Various business buildings. Park and South Main streets. Department store, drug store and grocery. Six 3-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in basement of drug store. Discovered by policeman about 12:45 a. m. Alarm, box. Duration, 5 hours. Stopped when it reached 3-story brick building. Fire was favored by wood construction; old buildings, no fire walls. Persons in building, about 25. Means of escape, stairways and iron fire-escapes. Value of buildings and contents, $200,000. Property loss, $25,000.

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DEPARTMENT STORES

December 16, 1917. St. John, N. B. F. A. Johnson. Dock and Union street. Department store. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by passerby about 11 p. m. Alarm, usual fire-alarm system. Duration, 5 hours. Stopped in same building where it started. Fire was somewhat retarded by brick walls. Firemen handicapped by intense cold—temperature below zero. Persons in building, none. Means of escape, ordinary exits. Value of building and contents, about $90,000. Property loss said to be $80,000.

DWELLINGS, ORDINARY CITY

December 8, 1917. Orange, Texas. L. Miller. Main and 3d streets. Dwelling. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, supposedly defective flue. Fire started in attic next to flue. Discovered by night watchman about 4:45 a. m. Alarm, messenger—1½ blocks from fire station. Duration, about 4 hours. Stopped when building was consumed. Fire was favored by wood construction. Fireman handicapped by cold weather and high wind. Persons in building, 4. Means of escape, stairs. Value of building and contents, $30,000. Property loss, $25,000.

December 11, 1917. Youngstown, Ohio. Joseph G. Butler. 525 Wick avenue. Dwelling. One 3-story dwelling partially destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, overheated gas furnace. Fire started in basement. Discovered by seeing the smoke about 4:42 p. m. Alarm, telephone. Duration, 5 hours. Stopped after destroying roof and upper floor. Fire was favored by old building of frame construction. Firemen handicapped by tardy alarm; occupants of house tried to extinguish fire before turning in alarm. Persons in building, 7. Means of escape, front and rear stairways. Value of building and contents, $100,000. Property loss, $80,000. Valuable papers were protected. Owner was an art collector, and third floor of dwelling was used as art gallery. Only a part of the rare pictures, valued at more than $100,000, were saved.

DWELLINGS, ORDINARY COUNTRY

December 13, 1917. Fayville, Mass. Mrs. A. Brewer. Turnpike road. Dwelling. One 1½-story dwelling destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in first story; probably in kitchen. Discovered by passengers on passing trolley car about 8:30 p. m. Alarm, messenger to fire station. Duration, about 3½ hours. Stopped when building was consumed. Fire was favored by all wood construction. Firemen handicapped by lack of water. Persons in building, 1. Killed, 1. Means of escape, front and side doors and windows. Value of building and contents, $3000. Property loss, $2,000.

December 16, 1917. Birdsboro, Pa. G. Brooke. Private grounds. Dwelling. One 3-story dwelling destroyed. Walls, stone. Floors, wood. Roofs, slate. Cause, overheated flue. Fire started around flue. Discovered by chauffeur who heard crackling of flames about 4:20 a. m. Alarm, telephone. Duration, 10 hours. Stopped at basement. Fire was retarded by substantial construction. Firemen handicapped by heavy snow drifts. Persons in building, 7. Means of escape, doors and windows. Value of building and contents, $75,000. Property loss, $50,000.

ELECTRIC TRACTION PROPERTIES

December 14, 1917. Trenton, N. J. Trenton & Mercer County Traction Corporation. Lolor and Davis streets. Barn for storage and repair of cars. One 1- and 2-story building partially destroyed. Walls, brick. Floors, concrete. Roofs, slag. Cause, unknown. Fire started in center of building. Discovered by employes. Alarm, telephone and street box. Duration, 3 hours. Stopped after destroying about 1/3 of building. Fire was retarded by fireproof construction; nothing to burn except roof and contents of building. Private fire apparatus, line of ½-inch hose from standpipe on ground floor. Persons in building, none. Means of escape, front and rear entrances; window on side. Value of building and contents, $100,000. Property loss, $28,000.

FLOUR AND CEREAL MILLS

December 30, 1917. Syracuse, N. Y. General Feed & Flour Company. 140-142 Dickerson street. Dealer in flour and feed. One and 2-story building destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in center of building. Discovered by passerby about 6.05 p. m. Alarm, telephone. Duration, 7 hours. Stopped when building was consumed. Fire was favored by all wood construction. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING.

FOUNDRIES AND MACHINE SHOPS

January 26, 1918. Kansas City, Mo. A. Holtman Company and others. Corner 18th and Holmes streets. Stoves and furnaces, plating works, automobile accessories and paper box factory. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started near elevator shaft in center of building. Discovered by watchman and a workman about 3:22 a. m. Alarm, telephone. Duration, about 3½ hours. Stopped in building where it started. Fire was favored by open elevator shaft. Persons in building, 2. Means of escape, fire-escape. Property loss approximately $70,000.

GARAGES AND AUTO REPAIR SHOPS

December 11, 1917. South Milwaukee, Wis. G. Breitbach. 2210 12th avenue. Dealer in automobiles. One 1-story building destroyed. Walls, brick. Floors, cement. Roofs, wood.

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Cause, unknown. Fire started in northwest corner near furnace. Discovered by passerby about 2:30 a. m. Alarm, telephone. Duration, 1 hour and 20 minutes. Stopped when building was totally destroyed. Fire was favored by open construction; no partitions in building. Firemen handicapped by tardy alarm; building entirely ablaze when department arrived. Private fire apparatus, 6 hand chemicals. Persons in building, none. Means of escape, doors and windows. Value of building and contents, $50,000. Property loss, $22,000.

GENERAL STORES

December 8, 1917. Cameron, Wis. Home Mercantile Company and other buildings. Main street. General store and opera house. Three 2-story buildings and one 1-story building destroyed. Walls, wood and cement block. Floors, wood. Roofs, wood covered with galvanite. Cause, unknown. Fire started in basement of general store. Discovered by seeing smoke about 6:30 p. m. Alarm, messenger across the street. Duration, 8 hours. Stopped at east end of the block. Fire was favored by failure of walls. Firemen handicapped by extreme cold weather. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $44,000. Property loss, $28,000. Valuable papers were protected.

IRON AND STEEL MILLS

December 23, 1917. Boston, Mass. Crucible Steel Company. Congress street. Iron and steel plant; machine shop and electric storage plant. Three upper floors of 5-story building practically destroyed. Walls, brick. Floors, mill construction. Roofs, tar and gravel. Cause, unknown. Fire started in third story, rear center of building. Discovered by railroad employes about 4:17 a. m. Alarm, box. Duration, 5 hours. Stopped in fifth story of building, where it started. Fire was retarded by heavy party walls, which separated building from those adjoining. Firemen handicapped by dense smoke and icy streets and ladders. Persons in building, none. Means of escape, enclosed stairway and rear fire-escapes. Value of building and contents, $800,000. Property loss about $100,000.

MANUFACTORIES, MISCELLANEOUS

December 6, 1917. New Castle, Del. Wilmington Fibre Specialties Company. Seventh and Washington avenues. Manufacturing fibre specialties. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood and tin. Cause, unknown. Fire started in second story, northwest end of plant. Discovered by watchman about 2:30 a. m. Alarm, telephone. Duration about 10 hours. Stopped at fire wall after destroying about one-fourth of plant. Fire was retarded by fire doors and good fire walls. Persons in building, none. Means of escape, ample. Value of building and contents, $150,000. All valuable papers were protected.

December 10, 1917. Wallaceburg, Ont. Dominion Sugar Company. Manufacturing sugar and stock food. One 1- and 2-story building destroyed. Walls, brick. Floors, concrete and wood. Roofs, wood and paroid. Cause, overheated dryer. Fire started at end of dryer. Discovered by employes about 10 p. m. Alarm, telephone. Duration, 1 hour and 15 minutes. Stopped in same building in which it started. Private fire apparatus, hose and hydrants. Persons in building, 30 to 40. Injured, 1; broken leg. Means of escape, doors and windows. Value of building and contents, $100,000. Property loss total. All papers and records were kept in the company offices in an isolated building.

MANUFACTORIES, TENANT BUILDINGS

January 27, 1918. Philadelphia, Pa. Union Ribbon Carbon Company. Rear of 67 Laurel street. Manufacturing typewriter ribbons. Candy company in same building. One 3-story building destroyed. Walls, brick. Floors, wood. Cause, unknown. Fire started in first story. Discovered by citizen about 4.48 a. m. Alarm, street box. Duration, 10 hours. Stopped in building of origin. Firemen handicapped by dense smoke. Persons in building, none. Means of escape, fire-escape and fire tower.

MERCANTILES, MISCELLANEOUS

December 8, 1917. New Iberia, La. Estorge Drug Company. Main Street. Wholesale and retail drugs. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, metal. Cause, unknown. Fire started in second story. Discovered by passersby about 12:15 a. m. Alarm, verbal. Duration, 24 hours. Stopped in same building where it started. Fire was retarded by fire walls. Persons in building, 25. Means of escape, 2 stairways and openings on ground floor. Value of building and contents, $105,000. Property loss, $40,000. All papers of value protected.

December 14, 1917. Frostburg, Md. Several business buildings. West Main street. Drug, furniture and jewelry stores, grocery and barber shop. Five 2- to 4-story buildings destroyed. Walls, brick and frame. Floors, wood. Roofs, tin. Cause, overheated furnace. Fire started in basement of Shea building. Discovered by policeman about 5 a. m. Alarm, bell. Duration, 8 hours. Stopped at Lyric Theater and Gladstone Hotel. Fire was retarded by brick walls. Firemen handicapped by insufficient water pressure. Persons in building, none. Means of escape not reported to SAFETY ENGINEERING. Value of buildings and contents, $200,000. Property loss, $200,000.

December 16, 1917. Des Moines, Iowa. Brinsmaid & Co. 215-217 West 4th street. Wholesale and retail china and glassware. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started on ground floor near elevator. Discovered by citizens about 7:29 p. m. Alarm, telephone. Duration, 4 hours. Fire was confined to building. Fire was favored by open

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elevator shaft and stairways and wood construction. Persons in building, none. Means of escape, 1 fire-escape. Value of building and contents, $136,700. Property loss about $81,700. All valuable papers protected by fireproof safe.

December 19, 1917. Erie, Pa. W. E. Fulmer & Son. Eighth and State streets. Furs and coats. One 2-story building destroyed. Walls, brick and wood. Floors, wood. Roofs, roofing paper. Cause, overheated furnace. Fire started in basement. Discovered by passerby about 10:45 a. m. Alarm, telephone and box. Duration, 4 hours. Stopped in same building. Fire was favored by ordinary construction. Persons in building, 25. Means of escape, front and rear exits. Property loss, $70,000. Valuable papers were lost in this fire.

MERCANTILES, TENANT BUILDINGS

December 15, 1917. Bryan, Texas. First National Bank building. Main and 25th streets. Bank, general store and meat market on ground floor, offices and K. of C. lodge rooms in second story. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, composition roofing. Cause, probably careless smoking. Fire started in K. of C. billiard room. Discovered by passerby about 1:55 a. m. Alarm, telephone. Duration, under control in 1 hour; grocery stock burned 3 hours. Stopped in same building. Fire was favored; it burned into a wood partition and spread between ceiling and roof. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $65,000. Property loss, $52,000. All valuable papers were protected in safes and bank vaults.

December 18, 1917. Muskogee, Okla. Terminal building. Calahan and C streets. Laundry, music and secondhand stores, garage; apartments in second story. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unprotected smokestack in laundry. Fire started between ceiling and floor in laundry. Discovered by employes of laundry about 4:30 p. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Firemen handicapped by low water pressure due to a break-down of one of the engines at pumping station. Persons in building, about 30. Means of escape, 2 stairways. Value of building and contents, $47,500. Property loss, $39,000.

January 27, 1918. Taunton, Mass. Taylor building. City Square. Stores and offices. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, wood, tar and gravel. Cause, supposedly defective wiring. Fire started between 1st and 2d stories. Discovered by police officer about 4:05 a. m. Alarm, street box. Duration, about 12 hours. Stopped when roof was burned off; little fire below the ceiling of second story. Fire was favored. Building was constructed for 3 stories, but finished with two; floor was laid on ceiling timbers with a space of 3 feet to the roof, all open, 50 by 160 feet. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building alone, $50,000. Property loss $75,000.

MISCELLANEOUS

November 29, 1917. Brooklyn (Coney Island), N. Y. Parkway Baths and other buildings. Ocean front between Ocean Parkway and Coney Island avenue. Public baths. Three buildings destroyed; one building badly damaged and 3 others slightly damaged. One, 2 and 3 stories high. Walls, frame. Floors, wood. Roofs, wood. Cause, unknown. Fire started in southeast corner of 1st story of bathhouse. Discovered by unknown person about 6:20 a. m. Alarm, box. Duration, 1 hour and 30 minutes. Stopped after spreading to adjoining buildings. Fire was favored by inflammable wood construction. Private fire apparatus, water pails, hooks, axes, fire extinguishers and standpipes on all floors. Persons in building, not reported. Injured, 3 firemen. Means of escape, fire-escapes on north side of building. Value of buildings and contents, $230,000. Property loss, $230,000.

December 10, 1917. Belvedere, Cal. Union Fish Company. Built on piles over the water. Fish drying and packing plant. One 1-story building destroyed. Walls, wood plank. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in a storeroom. Discovered by employe about 1 a. m. Alarm, telephone. Duration, 3 hours. Stopped after destroying about 1/3 of building. Fire was favored by all wood construction. Fire was extinguished by means of San Francisco fire tug. Persons in building, about 25. Means of escape, stairway. Value of building and contents, approximately $10,000.

January 2, 1918. Harrisburg, Pa. Harrisburg Pipe and Pipe Bending Company. Ninth and Herr streets. Manufacturing war munitions. One 1-story building destroyed. Walls, frame and brick, with corrugated iron sheathing. Floors, earth. Roofs, tin. Cause, explosion in paint barrel. Fire started about 3:48 a. m. Alarm, company's private box. Duration, 4½ hours. Stopped when building was consumed. Fire was favored by contents of building. Firemen handicapped by frozen fire plugs. Private fire apparatus, a few extinguishers. Persons in building, not stated. Injured, 2. Means of escape, not reported to SAFETY ENGINEERING. Property loss, $125,000.

January 26, 1918. Newark, N. J. Quartermaster's depot, United States Government. Bay avenue and Avenue R. Barges, piers, warehouses and cars. Cause, supposedly thawing sand. Fire started on dock. Discovered by guards about 1.46 a. m. Alarm, telephone. Fire stopped at end of dock, 4,300 feet from point of origin. Fire was favored, as it burned underneath the dock. Firemen handicapped by inability to reach the water side of the dock. Private fire apparatus, American-LaFrance engine, hose, extinguishers and men. Value of building and contents, $600,000. Property loss, $400,000.

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MOTION PICTURE FACTORIES AND FILM EXCHANGES

December 25, 1917. Philadelphia, Pa. Ideal Film Exchange. 235 North 13th street. Exchange for motion picture films. One 3-story building damaged. Walls, brick. Floors, wood. Cause, internal combustion of films caused by heat from radiation against wall of vault. Fire started inside vault. Discovered by employes in store about 12:27 p. m. Alarm, local and box alarm. Duration, about 2½ hours. Stopped in second story, through dumb waiter. Persons in building, 4. Means of escape, stairway and exit to flat roof in rear.

PAPER WORKERS

December 22, 1917. New Orleans, La. Standard Paper Company. 424-426 Pydras street. Manufacturing paper and woodenware. One 4-story building damaged. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started in 2d story among quantity of matches. Discovered by occupants about 1:57 p. m. Alarm, box. Duration, 6 hours. Stopped in building of origin. Persons in building, not stated. Means of escape, stairway. Value of building and contents, $55,000. Property loss, $28,000.

PIERS AND WHARVES

December 3, 1917. Brooklyn, N. Y. Morse Dry Dock Company. Foot of 56th street. Dry docks and repair shops. Five buildings destroyed and one other considerably damaged; 1 and 2 stories. Walls, brick and frame. Floors, wood. Roofs, wood. Cause, unknown. Fire started in carpenter shop in 2d story. Discovered by guardsman about 10:09 p. m. Alarm, box. Duration, 1 hour. Stopped after extending to pattern and welding rooms, machine shops and 2 garages. Persons in building not stated. Means of escape, 1- and 2-story buildings only. Value of buildings and contents, $75,000. Property loss, total.

PRINTERS AND BOOKBINDERS

December 8, 1917. Amarillo, Texas. Russell & Cockrell Publishing Company. 614 Polk street. Printers and bookbinders. One 1-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, door of heating stove was left open. Fire started on floor in front of stove. Discovered by passerby, who saw smoke issuing from building about 4:45 a. m. Alarm, telephone. Duration, 1 hour. Stopped in same building where it started. Fire was favored by wooden interior finish. Firemen handicapped by dense smoke from burning paper. Persons in building, none. Means of escape, not reported; 1-story building only. Value of building and contents, $30,000. Property loss, $11,000. All valuable papers were protected.

December 17, 1917. Newport News, Va. Plants of the *Times-Herald* and *Daily Press*. 217 25th street. Newspapers. One 2-story building damaged. Walls, brick. Floors, cement and wood. Roofs, wood. Cause, waste paper in basement near furnace. Fire started in basement. Discovered by flames coming up open elevator shaft about 8:23 a. m. Alarm, telephone. Duration, under control in 1½ hours. Stopped in same building where it started. Fire was favored by open elevator shaft. Persons in building, 12. Means of escape, stairways. Value of building and contents, $53,000. Property loss, $21,000. All valuable papers were protected.

SCHOOLS AND COLLEGES

December 22, 1917. South Hadley, Mass. Mount Holyoke College. College campus. Women's college; building containing museum and class rooms burned. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, electrical short circuit. Fire started in rear of second story. Discovered by passerby. Alarm, telephone. Duration, about 3 hours. Stopped when building was consumed. Fire was favored; no fire walls. Firemen handicapped by great distance from town hydrants. Private fire apparatus, 2 hose reels. Persons in building, none. Means of escape, fire-escapes. Value of building and contents, about $115,000. Property loss, almost total; salvage amounted to possibly $2,000. Valuable papers and records said to have been destroyed.

SLAUGHTER AND PACKING HOUSES

December 9, 1917. St. Louis, Mo. Morris & Co. 339 South Vanderventer avenue. Packing plant. One 1- and 2-story building damaged. Walls, frame. Floors, wood. Roofs, composition. Cause, unknown. Discovered by employe about 10 a. m. Alarm, fire alarm telegraph and street box. Duration, 1 hour. Stopped in same building. Fire was favored by wood construction. Persons in building not reported. Means of escape, 1- and 2-story building only. Value of building and contents approximately $54,000. Property loss, $2,200.

TANNERIES

November 9, 1917. Narrows, Va. Union Tanning Company. Main street. Tanning and manufacturing tanning extracts. Two 2-story buildings destroyed. Walls, frame, partially sided with metal. Floors, concrete and wood. Roofs, asbestos composition roofing. Cause, supposedly incendiary. Fire started in leach house. Discovered by watchman about 11 p. m. Alarm, factory whistle. Duration, 3 hours. Stopped in powerhouse. Fire was retarded by non-combustible roof and metal siding on walls. Private fire apparatus, company's own fire system—large tanks, together with twin pumps operated by steam and electricity. Persons in building, 10. Means of escape, inside stairways and outside fire-escapes. Property loss, $200,000.

THEATERS AND AMUSEMENT PLACES

December 9, 1917. Jefferson City, Mo. Gem Theater. 220 Monroe street. Motion picture theater. One 1-story building destroyed.

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Walls, brick. Floors, wood. Roofs, composition paper roofing. Cause, unknown. Fire started in stairway leading to the balcony. Discovered by passerby about 11:55 p. m. Alarm, telephone. Duration, 8 hours. Fire was retarded by closed attic of about 8 inches between ceiling and roof. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $14,000. Property loss, $9,000.

WAREHOUSES, PUBLIC STORES

January 26, 1918. Paterson, N. J. Fidelity Storage & Furniture Company. 193 Van Houten street. Storage warehouse. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, slag. Cause, unknown. Fire started in 2d story near center of building. Discovered by passerby about 8:56 p. m. Alarm, telephone. Duration, 7 hours. Stopped in same building in which it started. Fire was retarded by brick walls. Firemen handicapped by building 250 feet long with no partitions; no way of fighting fire from inside. Persons in building, none. Killed, 1 person killed in adjoining building by falling wall. Means of escape, not reported. Value of building and contents, $50,000.

WOODWORKERS

December 9, 1917. Glasgow, Ky. Glasgow Flooring Company. On branch railway west of city limits. Manufacturing flooring—plant closed down. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, felt. Cause, unknown. Fire started in tying room in 2d story. Discovered by boy passing the building about 1:20 p. m. Alarm, telephone. Duration, 2 hours. Stopped when buildings were consumed. Fire was favored by all wood construction. Persons in building, watchman.

KILLED AND INJURED IN FIRES

November 29, 1917. Brooklyn, N. Y. Parkway Baths and other buildings at Coney Island. Three firemen injured.

December 10, 1917. Wallaceburg, Ont. Dominion Sugar Company. One person injured.

December 13, 1917. Fayville, Mass. Mrs. A. Brewer. Dwelling. One life lost.

January 2, 1918. Harrisburg, Pa. Harrisburg Pipe & Pipe Bending Company; manufacturing war munitions. Two persons injured.

January 26, 1918. Paterson, N. J. Fidelity Storage & Furniture Company. One life lost; killed in adjoining building by falling wall.

Letters to the Editor

STATE FIRE MARSHALS

EDITOR, SAFETY ENGINEERING: Will you kindly advise us if we can get a list of the members of the Fire Marshals' Association? Thanking you for the information.

O. R. E.

A list of the members of the Fire Marshals Association of North America is appended:

Alabama: Frank Samford, Montgomery.
Arkansas: *Bruce T. Bullion, Little Rock.
Brit. Col.: *Ernest F. Guenther, Victoria.
Connecticut: Thomas F. Egan, Hartford.
D. C.: Phil. Wl. Nicholson, Washington.
Georgia: W. R. Joyner, Fire Insp., Atlanta.
Illinois: John C. Gamber, Springfield.
Indiana: H. H. Friedley, Indianapolis.
Iowa: Ole O. Roe, Des Moines.
Kansas: L. T. Hussey, Topeka.
Kentucky: Thos. B. Pannell, Frankfort.
Louisiana: W. M. Campbell, New Orleans.
Maine: *E. J. Carter, Augusta.
Maryland: *Wm. Mason Sheehan, Baltimore.
Massachusetts: John H. Plunkett, Boston.
Michigan: *Frank H. Ellsworth, Lansing.
Minnesota: *J. B. Sanborn, St. Paul.
Mississippi: T. A. Brown, Jackson.
Montana: A. E. Eklund, Helena.
Nebraska: W. S. Ridgell, Lincoln.
North Carolina: *Jas. R. Young, Raleigh.
North Dakota: H. L. Reade, Bismarck.
Ohio: T. Alfred Fleming, Columbus.
Oklahoma: C. C. Hammonds, Oklahoma City.
Ontario: E. P. Heaton, Toronto.
Oregon: *Harvey Wells, Salem.
Pennsylvania: G. Chal Port, Harrisburg.
Sask.: †Arthur E. Fisher, Regina.
South Carolina: F. H. McMaster, Columbia.
South Dakota: S. E. Crans, Lead.
Tennessee: E. M. Gillenwater, Nashville.
Texas: S. W. Inglish, Austin.
Virginia: Joseph Button, Richmond.
Vermont: *Joseph G. Brown, Montpelier.
Washington: *H. O. Fishback, Olympia.
West Virginia: John H. Horan, Charleston.
Wisconsin: *M. J. Cleary, Madison.

Officers of the association for 1917-18, are as follows: James R. Young, president; W. M. Campbell, vice-president; John Gamber, secretary-treasurer. The executive committee is composed of the above mentioned three gentlemen and also L. T. Hussey and E. R Heaton.

*Insurance Superintendent. †Fire Commissioner.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

DERBY ELECTRIC RELEASE BOX

The American Fire Prevention Bureau, Inc., 17 Madison avenue, New York City, has placed on the market the Derby Electric Release Box, which is designed to close fire doors, stair and elevator traps, dip-tank covers, open theater ventilators, theater drop fire curtains, and for several other uses. It may be operated by one or more of the following methods:

1. By the operation of an electric circuit closer connected to an alarm valve in a sprinkler system.
2. By the operation of an automatic thermostat system.
3. By the operation of a private fire alarm system.
4. By the operation of a manual switch.

The operating current can be either A. C. or D. C., derived from reliable public service, storage batteries or dry cells in multiple. Assuming a voltage of 120, each box requires 150 milli-amperes to trip it, or 500 milli-amperes at 6 volts. The boxes are wired in series.

The Derby Release Box is a valuable addition to modern fire-prevention apparatus as it provides a reliable means of closing fire-doors, which insures the proper operation of the door itself. The fire-doors and other devices to which the release is attached can be tested daily by closing a testing switch. The Derby Electric Release Box has been approved by Underwriters' Laboratories and also the fire department of the City of New York.

ASBESTOS PROTECTION CLOTHING

G. W. Gerding, 405 Commerce Street, Philadelphia, Pa., manufacturer of asbestos protection clothing, is placing on the market a line of gloves, mittens, leggings and aprons for use in foundries and metal working plants. It is very important that the men handling molten metal be given the very best protection possible from the danger of splashing or spilled metal.

In addition to his general line of asbestos clothing, the above mentioned manufacturer is prepared to design special protection asbestos clothing to meet individual requirements.

LOCKE ENGINE STOP

For many years the Locke Regulator Co., of Salem, Mass., has manufactured a line of reliable engine stops. The automatic engine stop and speed limit system made by this firm, consists of an electrically operated valve, installed in the supply pipe of the engine, and a speed limit governor driven from the engine shaft which operates to close an electric circuit whenever the speed of the engine exceeds the normal, thereby shutting the main valve in the supply pipe of the engine.

The Combination Throttle and Independent type of engine stop valves are also included in the Locke line of engine equipment. Special equipment is designed by this company to meet individual requirements.

IMPROVED INTERLOCKING DEVICE

An important improvement in interlocking elevator apparatus is announced by Franz A. Boedtcher, 355 West 42nd St., New York City. A serious disadvantage of the interlocking type of elevator appliances has always been that the operator of the car could throw the interlock out of operation by throwing the switch. The glass and metal cover of the switch offered little protection, because the operator could remove the screws and thus open the box. By a special arrangement designed by Mr. Boedtcher, the cover cannot be removed from the switch and the only way to get at the switch is to break the glass. Further particulars may be obtained from the above-mentioned manufacturer.

TRUMBULL ELECTRIC MFG. CO. HONORED

The Trumbull Electric Mfg. Company of Plainville, Conn., manufacturer of the "Circle T" Safety Switch Equipment, has been elected a member of the Rice Leaders of the World Association, New York. Through this connection the company will enjoy an affiliation with other leading manufacturers in different lines of business.

The association is composed of concerns universally known for quality merchandise and high principles of business conduct.

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SAFETY CLOTHING FOR INDUSTRIAL WORKERS

The attention of industrial safety men cannot be brought too strongly to bear upon the importance of safe clothing for industrial workers. The hazard of loose sleeves, ties, or parts of a workman's clothing becoming caught in moving machinery is a serious one, and one which has been the cause of considerable loss of life and limb. A workman is liable to overlook the ragged edge of his shirt-sleeve or overalls until the moment when he is drawn into the moving machinery and the accident occurs.

The H. D. Lee Mercantile Company of Kansas City, Mo., manufactures a safety working garment for industrial workers which is designed to eliminate the possibility of loose clothing accidents. Being in one piece, having no loose straps on sleeves, no belt, suspenders or dangerous coat tails, it embodies in its design, the necessary features to make it a safe garment for men working about dangerous machinery.

The above mentioned manufacturer will gladly furnish further details regarding his product upon request.

SANITARY WASHING EQUIPMENT

The installation of sanitary and convenient washing equipment for employes is acknowledged by safety and health officials as being an important step toward the goal of health conservation and individual efficiency. The effects of clean, sanitary washing facilities manifest themselves in the individual workman's production and general efficiency.

The Standard Sanitary Manufacturing Company of Pittsburgh, Pa., has prepared an illustrated book, "Factory Sanitation" dealing with the subject of industrial sanitary equipment and illustrating the various types of washing equipment manufactured and installed by this company which may be obtained upon request.

ANDERSON NOZZLES

The nozzle is a most important piece of fire-fighting apparatus and as every experienced fire-fighter knows, unless the nozzle furnishes straight, powerful streams, there is little chance of holding a fire once it has attained a good start. The G. A. Anderson Manufacturing Company, Baltimore, Md., manufactures a reliable nozzle which is a combination shut-off, straight-stream and spray nozzle, with exclusive features. It throws either a straight stream or spray alone, or both at the same time. The spray may be thrown at any angle, thus affording protection to nozzlemen from heat, smoke, and hot cinders. It is especially recommended as a cellar pipe and is operated by one man at any pressure. It is of simple and durable construction. The manufacturer of the Anderson nozzle furnishes a nozzle for trial.

ANNUAL STATEMENT OF SPRINGFIELD F. & M. INS. CO.

The 69th Annual Statement, January 1, 1918, of the Springfield Fire & Marine Insurance Co., of Springfield, Mass., shows a very successful business for the year 1917.

President Damon announces the following figures which show a substantial increase in total assets, premiums written and reinsurance reserve.

		Increase
Total Assets...	$13,224,033.34	$1,262,057.03
Net Surplus....	2,525,719.88	11,267.08
Prems. Written	7,667,342.00	843,415.83
Reinsur. R's'rve	7,226,190.15	1,066,527.41

Since organization in 1849 the Springfield Fire & Marine Insurance Co. has paid to its policyholders $72,282,788.89.

KRANTZ SAFETY SWITCHES

The Krantz Manufacturing Company, 160 7th Street, Brooklyn, New York, manufacturer of the Krantz "Auto-Lock" Panel-boards and Switch equipment, calls attention to the fact that the elimination of shock hazards at this time of excessive production speed, in industrial plants is of vital importance. It is necessary to conserve our labor as well as supplies and fuel, and in the reduction of accidents, the safety enclosed switch holds an important position. The Krantz safety switch equipment is so constructed as to prevent shock to the worker even though the switch box or board be left open for repair, as the opening of the box automatically disconnects the current, making shock impossible.

The above-mentioned manufacturer will be pleased to supply further information regarding the safety switch equipment.

SQUARE D COMPANY HOLDS ANNUAL SALES CONVENTION

The first annual sales convention of the Square D Company, Detroit, Mich. (formerly the Detroit Fuse & Mfg. Co.), was held at the Hotel Statler, January 10, 11 and 12, and was attended by all of their sales representatives and members of the advertising department. Bryson D. Horton, president of the company, gave the opening address, which was followed by a talk on "The Industrial Plant," by A. MacLachlan, sales manager. L. D. Calhoun, advertising manager, spoke on "Industrial Advertising." General discussions followed all talks, and selling and advertising policies, division of territories, and other matters of importance were taken up.

Manufacturing and service problems were discussed at the Friday sessions, followed by a dinner at the Detroit Athletic Club in the evening, tendered by Mr. Horton.

A trip of inspection through the factory on Saturday, and a further discussion of Safety Switches, their manufacture and features, concluded the programme.

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NEW SMALL MOTOR SWITCHES

Below are shown illustrations of two switch Condulets of the ZY series—the latest additions to the large family of conduit fittings manufactured by the Crouse-Hinds Company, of Syracuse, N. Y. One of the country's leading mill engineers described these Condulets as the "last word in small motor switches." Whether his verdict is true or not, the fittings certainly have very much to commend them in design and material as well as in workmanship.

Type ZYC

(One-Gang, Through Feed)

As safety-first fittings, ZY Condulets seemingly leave little to be desired. It is claimed for them that they protect the switch operator and the person renewing fuses from shock; they cannot be operated by accident; they withstand the roughest usage; water will not drain into them, and it is impossible for lint or other inflammable particles to lodge upon the current-carrying parts, and thus create a fire hazard.

Both the body of the Condulet and its cover are cast iron. Inside is a combined 20-ampere snap switch and fuse block. The switch is externally operated, and its handle interlocks with the latch of the door in such a way that the latter cannot be opened when the switch is in the "on" position. As a result of this arrangement, the circuit is dead when the door is open, and fuses can be replaced without danger of shock or short circuit.

Type ZYU

(Two-Gang, Through Feed — One main, two branch hubs)

As the machine operator or any other person not skilled in electricity can change fuses with perfect safety in ZY Condulets, their use prevents all the loss in productive time which is unavoidable where an electrician must be sent for to replace fuses. This, in the course of a year, means a considerable saving in the operating time of the average mill.

The manufacturers list ZY Condulets in one and two-gang forms and in sizes and arrangements of threaded conduit hubs to meet various conduit wiring arrangements. They have also issued a folder on ZY Condulets which they will mail free to any address upon request.

NEW APPROVED EXPLOSIVES SIGN

War legislation has outlined many things to protect our industrial plants and operations. One of the most far-reaching enactments is the act passed by Congress to regulate the manufacture, distribution, storage, and use of explosives. Section 16 of this act reads as follows: "That every person authorized under this Act to manufacture or store explosives or ingredients, shall clearly mark and define the premises on which his plant or magazine may be and shall conspicuously display thereon the words, **'Explosives—Keep Off.'"**

In conformity with this ruling signs were immediately approved by the Director of Explosives Regulation as shown in this illustration:

SPECIAL EXPLOSIVES SIGN

This sign is 30 gauge steel material and is standard sizes 10" x 14" and 14" x 20", with baked varnish finish and lettering embossed. Thousands of these signs are now in use throughout this country, and it has proven itself a valuable factor in the enforcement of this explosives regulation act.

The Mine Safety Appliances Company, Chamber of Commerce Bldg., Pittsburgh, Pa., is making an exclusive campaign on this sign and orders are filled immediately from Pittsburgh, Pa.

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SAFETY ENGINEERING

VOL. 35 MARCH, 1918 No. 3

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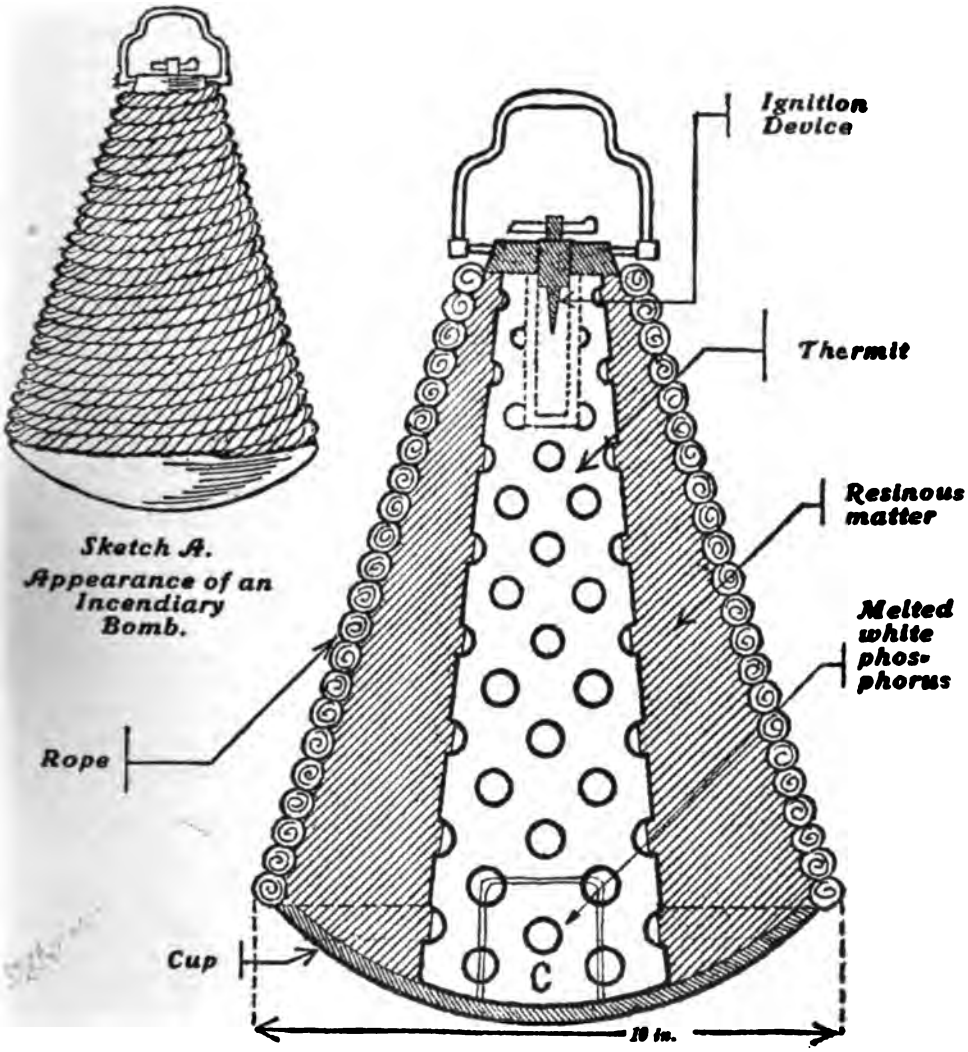
Bombs Dropped on London



Sketch A. Appearance of an Incendiary Bomb.

SECTION OF INCENDIARY BOMB.

See "Fires Due to Air Raids." Next Page

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Fires Due to Air Raids

Nature of Bombs Used and How to Deal with Fires Arising Therefrom

The British Fire Prevention Committee, Special Fire Survey Force, War Caution

THE ordinary explosive bombs employed by the enemy rarely cause a fire *per se,* but where a building is injured, fires are frequently caused by open lights or fires, etc., or arcs from broken cables, and spread by escaping gas, etc.

Fires thus caused indirectly by explosive bombs can as a rule be dealt with as ordinary fires in the incipient stage. Any gas or electrical supply not cut off prior to the outbreak should, if possible, be cut off at the earliest opportunity.

2. The incendiary bombs employed by the enemy readily fire buildings and their contents owing to the fierce nature of the flames generated by the chemicals used.

Fires caused by incendiary bombs may be prevented from spreading, regardless of the high temperature generated at the actual seat of the outbreak, *if water be promptly applied* in fair bulk, force and continuity, say from a series of buckets energetically thrown, or hand pumps vigorously worked. The application of single buckets of water or single liquid extinguishers, etc., would be comparatively valueless, a *concentration* of the available first-aid appliances being required to obtain the necessary result.

Note: In order to deal with fires from incendiary bombs, their make should be understood and the following describes one of the types frequently used:

(a) The bomb, as a rule, is conical, of 10 inches diameter at the base, corded round, and has a metal handle at the apex (see A, page 129).

(b) The base is a flat cup, on which a pierced metal funnel is fitted, having the ignition device and handle fitted at the top.

(c) The funnel is generally filled with thermit, which upon ignition generates intense heat and by the time of the concussion has taken the form of molten metal of the extraordinary high temperature of over 5,000° Fahr. The molten metal is spread by the concussion.

(d) Outside the funnel is a padding of a highly inflammable or resinous material bound on with an inflammable form of rope. This material creates a pungent smoke.

(e) There is generally some melted white phosphorus in the bottom of the cup which develops nauseous fumes (see C, page 129).

(f) In some cases celluloid chippings are added and occasionally a small quantity of petrol.

3. If poison gas is used its presence can often be detected by its irritating and peculiar smell. A simple form of respirator that would cover the nose as well as the mouth, and could be readily dampened, should be kept handy. The *police recommend* a pad of cotton waste enclosed in gauze to tie round the head, and saturated in a strong solution of washing soda.

Precautions:

The public is advised in case of bombardment to remain indoors. The lower floor, or a basement or cellar with facilities for exit into the open, may be expected to afford, as a rule, safer shelter than the upper floors.

Avoid standing opposite window openings and doors—where there would be special danger from flying fragments and broken glass if a bomb should fall outside! Do not stand under a skylight!

All gas lights or stoves should be turned out, and the gas *thereupon* turned off at the meter.

All electric lights should be switched off, and the supply turned off at the main switch.

All oil lamps should be extinguished and taken into the cellar or basement.

All open fires should be extinguished.

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All doors and windows should be closed, also shutters where such exist. They should not be opened upon the apparent termination of the raid, otherwise lights might thereby be shown externally.

Don't wait until a fire occurs to find the best way out in the dark. Think of a way out beforehand.

Buckets of water (supplemented where feasible by ordinary hand pumps) are recommended as the most suitable and economical fire appliances. All buckets should be kept three-quarters full, ready for use, and some should be kept on each floor if possible.

Pitchers and other minor household vessels should be kept filled, ready for use, and where there are baths, washtubs, etc., these should be kept filled so that a supply of water may be available to meet the possibility of water mains failing. Where there are garden utensils, such as syringes, garden pumps, etc., they should be readily accessible.

If, where funds permit, these first-aid fire appliances are supplemented, or partially replaced by portable *liquid* chemical extinguishers, they should be of from *2 to 3 gallon capacity,* properly maintained and be *in sufficient number.* Confidence should not be placed in the possibility of promptly recharging a liquid extinguisher during a fire.

Persons purchasing *liquid* extinguishers should require a written guarantee that they comply with either the specification of the Board of Trade, H. M. Office of Works, the Metropolitan Police or the British Fire Prevention Committee. So-called "Hand grenades" are not recommended.

Fine dry sand, or soil in bulk, might also be of use, but it would not have the necessary cooling effect. When inflammable liquids are alight it has, however, certain advantages over water. The sand, etc., should be kept in scuttles, bins, boxes or buckets, with scoops or shovels for applying it, and should be kept broken up and dry.

Attention is drawn to the *police warning* that *no reliance* can be placed on *"dry* powder extinguishers" for effectively controlling fires such as are likely to be caused by explosive or incendiary bombs.

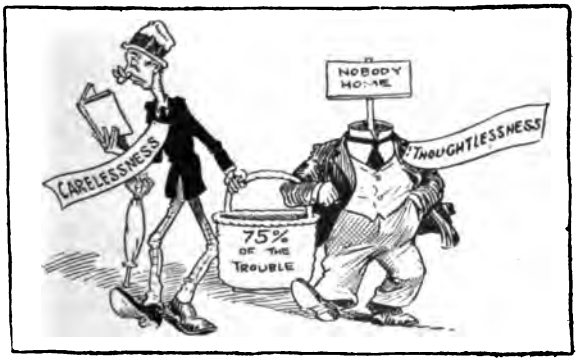
Occupants should know where the available fire appliances are kept and how to use them.

Ascertain the quickest means of obtaining assistance from the fire brigade and police; post up these particulars on the ground floor, including the position of the nearest fire alarm, telephone "number," etc. Do not fail to immediately notify of any outbreak, as it may not be possible for the fire to be extinguished with the available appliances.

DON'T RUN OR SHOUT. KEEP CALM AS AN EXAMPLE TO OTHERS.

BUCKETS OF WATER SHOULD ALWAYS BE AVAILABLE AND ALSO, WHERE OIL OR SPIRIT IS USED, BUCKETS OR BINS OF DRY SAND WITH SCOOPS.

Carelessness, "Nobody Home"



DON'T GIVE THESE FELLOWS A CHANCE!

They Are Responsible for Three Out of Every Four Accidents

Electric Railway Section, National Safety Council

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Safety Engineering in General Contracting

By L. D. von Woedtke

Director of Safety, Fred T. Ley & Co., General Contractors, Springfield, Mass.

Address Before the Connecticut Society of Civil Engineers, February.

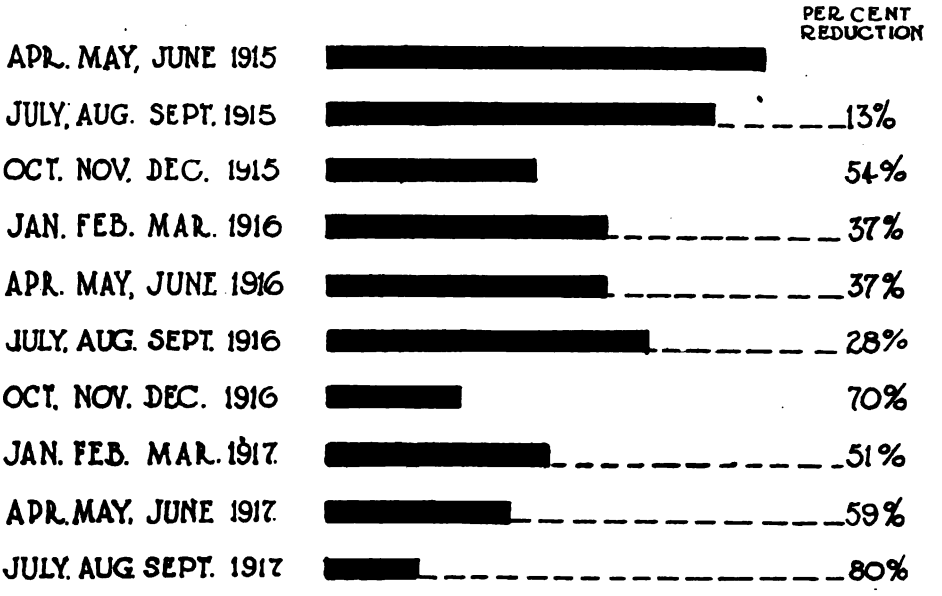
THE time and money spent in safety work, not only comes back, but eventually results in a new form of dividend, heretofore not considered, under profit and loss.

A chart of Fred T. Ley & Co., Inc.'s lost time, accident classification, shows comparisons for the last three years, namely 1915, 1916 and 1917. Using 1915, when we started systematic and organized safety work, as a basis, our reduction in accident rate per 1,000 employes for 1916 was 25% and for 1917, 55%. The highest quarterly reduction was 80% for July, August and September, 1917.

By way of comparison, the accident cost reduction for 1916 was 53% and for 1917 was 66%.

Our classification chart for the same period, dividing our accidents into eight

FRED T. LEY & CO., INC. LOST TIME ACCIDENTS, APRIL 1, 1915, TO SEPTEMBER 30, 1917, INCLUSIVE. PER CENT REDUCTION IN ACCIDENT RATE PER 1,000 EMPLOYES, SHOWN BY QUARTERLY PFRIODS.



REDUCTION BY YEARS	1916	1917
ACCIDENT FREQUENCY	25%	55%
ACCIDENT COST	53%	66%

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classifications or causes, was as follows:

Handling materials.
Falling materials.
Employes falling.
Handling tools.
Nails.
Flying materials.
Machines.
Miscellaneous.

The chart shows the number of accidents per 1,000 employes and the percentage of reduction for each year and each cause.

For the future, we will add four additional main causes, and when our monthly compilation of this data shows any cause or causes running high in percentage, it will be subdivided for two or three months to locate the particular occupations requiring special attention.

The figures I will quote, do not include our work at Camp Devens, Mass., as that contract was so large and out of the ordinary, that its experience would give our chart and classifications a false or padded result.

Regarding our building the huge army cantonment at Camp Devens, I might say in passing, as to safety work, accident prevention, first aid, etc., that we maintained through the entire work, a first class safety engineer, who traveled the job in an automobile, seven days a week, visiting the hundred odd foremen and gangs, both night and day shifts. He made over 100 recommendations, which were all carried out, and secured the friendly and constant co-operation of every superintendent, foremen and straw boss on the job.

Bulletins, signs and instructions in several languages were posted everywhere, and the total accident rate was probably less than on any cantonment in the country.

The Ley hospital with its surgeons and physicians, male nurse adjuster, stenographer, etc., of course, worked in connection with our safety department at all times.

The methods employed at Camp Devens have been put into effect by contractors on several other large Government operations.

Returning to our other operations, not including Camp Devens, I would state that the success in accident prevention, etc., we have attained, is due to a constant and systematic program of education and mechanical safeguards, and particularly through the enlistment and maintenance of the co-operation of our superintendents, foremen, timekeepers and men in the field.

We estimate that not over 30% of all our accidents can be eliminated by mechanical safeguards, and that at least 70% must be eliminated through safety education.

Our educational program consists mainly of periodical letters of encouragement, advice, suggestions and constructive criticism, quoting always some specific types of accidents, which are showing a high percentage and always stating or suggesting specific remedies. In this way, by making a drive against one or two specific causes, at a time, we have greatly reduced accidents in all causes, and continually take them up again, in turn, for further reduction.

We also encourage suggestions and ideas, from all our employes, and when received, quote them in our general safety letters. Many of our best methods have been secured in this way.

We also use snappy safety slogans, at the foot of all letters sent out by our Safety and Protection Departments, which keep the men thinking safety.

Bulletin boards, are, of course, posted on all jobs, and fresh bulletins are supplied periodically. We usually send out four bulletins at a time, most of which are posted temporarily, until new ones are received; however, some are posted permanently. The job bulletin board is usually three or four feet square, and shows about 12 bulletins at a time. The larger jobs, of course, have more than one bulletin board, so that they may be readily seen by everyone. We consider this bulletin service invaluable, as men will look at striking illustrations, and read large type, well versed and short, who might otherwise, never get the "safety bug." The foreign laborer will also look at pictures, though he cannot read.

To give you some idea of the possibilities for safety work in general contracting, I will state a few methods we have employed, against each of the eight main

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causes of accidents, which I quoted in the beginning of my talk.

HANDLING MATERIALS

1. Proper piling and bracing of supplies of lumber, pipe, brick, cement, etc.

2. Stout sound runways and platforms of selected materials and proper construction. No makeshifts by workmen allowed.

3. Wheelbarrows, scale boxes, blocks and falls, dump and flat cars, etc., kept in good condition, or discarded, if unsafe. Constant inspection made, and employes requested to report all unsafe conditions.

4. Continual cautioning by foremen, ladders, etc., and elevator hoist shafts.

2. Passageways, floors, and working spaces kept clear of waste and surplus materials.

3. Good ladders with safety feet where advisable, or toed, braced or lashed, to prevent slipping.

4. Gates and railings at elevator and hoist shafts, located far enough from openings to prevent anyone leaning over being struck by car or bucket.

HANDLING TOOLS

1. Tool house and toolmen are provided, on all jobs, who inspect, repair or sharpen all tools.

FRED T. LEY & CO., INC.—PER CENT REDUCTION IN THE NUMBER OF LOST TIME ACCIDENTS PER 1,000 EMPLOYES, SHOWN BY YEARS

Classification of Accidents	1st Year—1915 No. Accidents per 1000 Employes	2d Year—1916 No. Accidents per 1000 Employes	2d Year—1916 Per cent Reduction	3d Year—1917 No. Accidents Per 1000 Employes	3d Year—1917 Per cent Reduction
Handling Material ...	72	55	24	33	54
Falling Material	63	35	44	16	75
Employes Falling	61	43	30	28	54
Handling Tools	32	28	12	13	59
Nails	80	71	11	42	47
Flying Material	12	21	*75	9	25
Machines	24	9	62	6	75
Miscellaneous	55	41	25	33	40
Total Average Reduction.....			25%		55%

* Increase.

against the "dropsy" habit and butter fingers.

FALLING MATERIALS

1. Skirt or toe boards on stagings, scaffolds and on all exposed edges of floors and elevator shafts, openings, etc.

2. Use of closed in chutes for rubbish and waste disposal.

3. Daily inspection of all hoisting apparatus, and equipment on the job, and thorough overhauling at main equipment plant when returned from or sent to a job.

4. Tables of safe loads for ropes, chains and cables, also slings, at various angles.

EMPLOYES FALLING

1. Railings on pits, staging, scaffolds, and unused sides of floor openings for

2. Plenty of tools provided, allowing one or more sets being repaired or sharpened while others are in use.

3. Heads of all bullpoints, chisels, drills and hammering tools, dressed and trimmed, every time points or edges are sharpened, thus eliminating burred or mushroomed tools.

4. All handles tightened or new handles put on, when they appear unsafe.

NAILS

1. Water boys, tool men, etc., equipped with hammers and they constantly bend over or pull out protruding nails.

2. Stripped forms in concrete work, piled clear of passage ways, as taken down and protruding nails piled downward.

3. All loose boards or planks with pro-

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truding nails continually picked up, or nails bent over by all men on the job.

FLYING MATERIALS

1. Goggles are on every job, in every tool box and tool house.
2. Foremen are held responsible for men wearing goggles, when chipping or drilling concrete, stone, steel, iron, etc.
3. Extra sets of chipping or drilling tools provided to allow one or two sets always being repaired or sharpened, while others are in use.

MACHINES

1. All gearing, revolving projections, keys, set screws, clute jaws, etc., thoroughly enclosed on mixers, hoisting engines, drums, winches, cranes, steam shovels, saws, etc.
2. Headless set screws, shaft and pulley housing wherever practicable.
3. Adequate grab handles and steps on locomotives, cranes, steam shovels, cabs, dump and flat cars, etc.
4. Correct guards on gauge glasses and water columns.
5. All saws (circular, split, cross cut, over head or treadle swing, band, etc.) equipped with approved safeguards, such as spreaders, blade enclosures, travel limits, table guards, etc.
6. Jointers or buzz planers provided with cylindrical or safety heads.
7. Pulley blocks equipped with side plates or flanges, to protect mesh point between ropes and blocks.
8. Hooks for large hoists, cranes and derricks, provided with handle on back.

MISCELLANEOUS

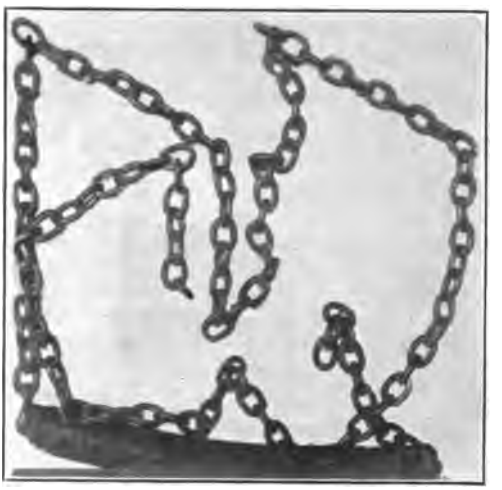
1. Acid carboys equipped with wooden frame inclinators.
2. Exposed electric wires, switches, transformers, etc., protected against personal contact wherever advisable by barriers, enclosures, cabinets, etc.
3. Adequate shoring in excavating, or tops kept broken down to prevent cave-ins.
4. Appropriate danger signs, tags and warnings.
5. Fire prevention boilers safely housed, smoke stacks fitted with spark guards, salamanders fitted with spark screens. Fire extinguishers provided on all jobs.

There are, of course, many other methods we are using in accident prevention, which time will not permit mentioning.

NOTE.—Twenty-four slides were then run off on the screen—showing charts, tables and classifications, also typical bulletins, safe and unsafe practices, and some forms of mechanical safeguarding applicable to general contracting.

Warning to Linemen

FROM the Gary Works of the Illinois Steel Company comes a warning to linemen to see that lines are grounded on both sides of the place where they are working. Repairs were being made on a 6,600 volt circuit. Switches were pulled and guarded at the power house. Linemen had placed the ground chain (shown in picture) on the line between where they were working and the power house. A ground occurred on a live circuit, on the same towers as the one under repair, seven towers further away from the power house. The ground ran up to the circuit under repair and the current was drawn by the ground chain to the tower where the work was going on.



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Jobs for Crippled Soldiers

Work of the Pennsylvania Department of Labor and Industry

THE Pennsylvania Department of Labor and Industry, Bureau of Employment and Division of Hygiene and Engineering, in co-operation with the Pennsylvania Committee of Public Safety, Department of Civilian Service and Labor, has sent to the employers of the State, the following questionnaire, anticipating the placement in Pennsylvania industries of disabled soldiers returned from war service. Employers are asked to indicate the number of handicapped men they can employ and to forward a complete report at their early convenience.

The Surgeon General's Office of the United States Army is arranging for the reconstruction and rehabilitation of men disabled and impaired in health in war service. Each disabled soldier will be equipped by the Government with every suitable appliance to bring his efficiency to a maximum. He will receive the nec-

DISABILITY	TYPE OF WORK OR MACHINE OPERATION	NO. OF POSITIONS	REMARKS
Loss of fingers—	One hand		
	Both hands		
Loss of hand at wrist—	One hand		
	Both hands		
Loss of arm below elbow—	One arm		
	Both arms		
Loss of arm at shoulder—	One arm		
	Both arms		
Stiff finger joints—	One hand		
	Both hands		
Stiff wrist joint—	One arm		
	Both arms		
Stiff elbow joint—	One arm		
	Both arms		
Stiff shoulder joint—	One arm		
	Both arms		
Partial loss of foot—	One foot		
	Both feet		
Loss of foot at ankle—	One foot		
	Both feet		
Loss of leg below knee—	One leg		
	Both legs		
Loss of leg at knee—	One leg		
	Both legs		
Loss of leg at middle of thigh—	One leg		
	Both legs		
Loss of leg at hip joint—	One leg		
	Both legs		
Stiffness of lower extremities—	One leg		
	Both legs		
Blindness—	One eye		
	Both eyes		
Deafness—	One ear		
	Both ears		
Loss of speech—			
Repulsive facial disfigurements—			
Hernia—			
General health impairment Which would prevent heavy manual labor			

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essary treatment and training to adapt him for selected employment.

Another questionnaire is intended to take a census of the positions now held by disabled men in industries in Pennsylvania. Each Pennsylvania employer is asked to report every diseased or crippled person working for him. The headings of this blank are as follows: Nature of Disability. Sex. Ages When Disabled. Present Age. Previous Occupation. Present Occupation. Degree of Success. Present Weekly Wage. Education Previous to Injury. Education or Special Training for Present Occupation. What Artificial Appliance Is Used. Remarks (nature of work and any interesting features in case).

Accident Prevention in Textile Industries

By David Van Schaack

President, National Safety Council

From an Address to the Agents, Stockholders and Representatives of Lockwood, Greene & Co., Boston

SAFETY work is based upon the practical application of a theory that has stood the test of experience.

The fast increasing opportunities of speaking upon the subject of accident prevention to representative men of one or another great branch of industry are unmistakable signs of a rapidly growing appreciation of the importance of safety work in industry and its true place in our social scheme. Even more convincing evidence is found in the National Safety Council's growth, within five years, from a membership of 40 to over 3,500 industrial concerns, employing about 6,000,000 workmen.

What is the reason for this widespread interest in safety work, this phenomenal growth of the National Safety Council, the expenditure, literally, of millions of dollars by the ablest of works managers in our country?

Let me tell you. A very few years ago the toll which accidents exacted from the industries of this country amounted to 35,000 men killed and 2,000,000 injured each 12 months.

A workman was killed every 4 minutes.

A workman was injured every 4 seconds.

This was the record for every working hour of every day.

Only adult male workmen were taken into account and no reference was made to the many women and minors even then employed in our industries.

From the moral, the humanitarian, viewpoint, accident prevention work is not an altruistic favor to anyone. It is simply social justice. Viewed from the economic side, accident prevention spells conservation—conservation of a country's greatest asset, the brain and brawn of her people—conservation of the greatest importance to industry.

Considerable as the direct cost of accidents may be, they are much more expensive to an employer through the lost time of injured men, through interruption of the work of fellow employes, through waste of material and spoilage of product by new men, through lessened production and through the time of foremen or others diverted for the training of men to take the places of the workers temporarily or permanently incapacitated because of accidental injuries. All

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such interferences with the ordinary course of a plant's work cause a loss in efficiency which is distinctly measurable in cold dollars and cents. The overhead expenses run along just the same, but without the same degree of offset as had the accidents not occurred. An employer told me some time ago that within a year there had been 2,100 days of absence on the part of his machine hands and that each day meant a loss of $7.50 to the concern, a total of $15,750. Safety work not only cuts down the loss in efficiency due to accidents, but it tends to increase output.

Another costly feature of accidents is found in the part which they play in labor turnover—that apt expression for the opposite of a stable working force. One of the most valuable features of safety work as organized today is that it reduces labor turnover; directly through lessening the number of employes injured, and indirectly through promoting better relations between employer and employed.

The thinking employer, the executive who takes carefully into account every single item of cost entering into the turning out of his product and who endeavors in every way to conserve his capital investment, must view with favor anything which tends to stabilize his working force. With the necessary money available, it is possible to build a factory and equip it with machinery in comparatively a few months, but the creation of an efficient working force is often a matter of years. No matter how carefully the original material is selected, it has to be readjusted, sifted out, replenished, resifted and readjusted again and again, before the desired efficiency is reached. All this takes time and real money—and plenty of it. Once created, an efficient working force is not only a most valuable asset but it represents a capital investment which is well worth all the protection that can be given it.

If safety work, in view of its influence on labor turnover, is important at all times, it is especially so now when the turnover is abnormal.

Labor turnover, however, is not of importance to the employer only—it means a great deal to the men in direct charge of the mills or of parts of them. If managers, superintendents and assistant superintendents are conscientious and loyal men they take all possible pains to see that buildings and equipment are not allowed to deteriorate, because they recognize that these mean a capital investment. They must be impressed with the fact that it is just as essential that they take the best of care of that other capital investment, an efficient working force.

ONCE UNDERTAKEN, SYSTEMATIC SAFETY WORK HAS NEVER BEEN GIVEN UP

I think you will agree with me that even the partial list of reasons I have enumerated for accident prevention work amply justified employers in giving it a real trial. That such trial has repeatedly demonstrated the soundness of the reasoning is proved by the fact that employers who have once undertaken systematic safety work have never given it up. It is hardly likely that they would with experiences in accident reduction ranging as high as from 80 to 90 per cent.

The International Harvester Company, in its 23 plants, (including coal mines, iron mines, railroads, logging camps, and all kinds of machine and woodworking shops) within five years

Reduced accidents 60 per cent,

Reduced deaths 60 per cent,

Reduced lost hours per man 61½ per cent,

Cut actual cost of compensation from 54 to 25 cents per $100 of payroll.

The Dodge Manufacturing Company, makers of transmission machinery, and probably an average hazard, within five years reduced the cost of compensation and medical service (which included the entire cost of accidents) from 50 cents to 7 cents per $100 of payroll. Within three years this company reduced the time lost due to accidents, beyond the fraction of the first day, from 39 hundredths to 11 hundredths of one per cent.

The American Smelting and Refining Company, in its Omaha plant, within three years reduced lost time acci-

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dents 90 per cent. During four months (from September 15, 1916, to January 15, 1917,) with 1,000 employes, not a single man was sufficiently injured to cause a loss of 24 hours.

The General Chemical Company, at its Bayonne plant in the year ending August 1, 1917, worked 500 men 534,296 hours with only 148 hours lost on account of accidents.

The National Tube Company's works at McKeesport, Pa., reduced lost time accidents 85 per cent during the four years ending with 1916.

The Eastman Kodak Company (Camera Works) commenced its safety campaign in 1910. At that time it had 3,755 employes and 412 accidents, or an average of 109 per thousand. In 1911, while the number of employes was increased to 4,311, the accidents were reduced to 309, a per thousand ratio of 71.68. In 1915, with 6,094 employes, the company had 133 accidents, a ratio per thousand of 21.83. The net percentage of reduction in five years was 80.1 per cent.

FUNDAMENTAL SAFETY PROBLEMS ARE COMMON PROBLEMS

How can such results, or anything like them, be obtained? That is certainly a very pertinent question. I shall endeavor to answer it to the best of my ability, although I hope you do not think that I have any idea of appearing before you as an expert in textile manufacturing or even in the safety work connected with it. Fortunately it is not necessary to be a specialist to set forth the value of accident prevention to a particular industry or to point out the principles of such work applicable to the industry. We are all apt to think that our own business is so different from others that it is peculiar to itself and requires special treatment in practically all respects; but that theory does not often stand actual test and certainly is not true of safety work. Textile mills have their own peculiar safety problems, just as other industries have. You have your specialized machinery, for instance, but your fundamental safety problem—that of overcoming the carelessness of both employer and employe—is the same as that of all industries. In overcoming carelessness, the same principles of safety work which are proving successful in so wide a range of other industries are the very ones applicable to your own, and the results obtainable elsewhere from the application of these principles can be obtained in your plants—are being obtained, as a matter of fact.

I used the phrase "carelessness of the employer" so that I might explain it and emphasize the need of overcoming it wherever it exists. By employer, I do not mean simply the man at the head of the business, the remote corporation, but the works manager—the treasurer, if you please—the man who is directly responsible for the running of the plant. There may be something in the reputed callousness of the great corporation, though I am inclined to think that is a sorely abused epithet, but I am sure the individual employer, as I have defined him, is just as truly a humanitarian as any other human being. When he does not take a real interest in accident prevention, it is merely because he does not realize the importance of the subject and from both humanitarian and economic viewpoints has not given the matter thought—is "careless," to put it in a word.

Whatever may be attempted in the way of safety work will be of little or no avail unless the employer is for it. You cannot expect your men to believe in a principle you do not believe in yourself, and you cannot expect organized safety work to be successful in your plant unless you initiate it and back it up. Safety work which is not organized never amounts to much. What is anybody's business is pretty sure to be nobody's business.

ESSENTIAL FEATURES OF SAFETY WORK

A well-organized campaign—that is the secret of success in safety work as in any other branch of industrial endeavor. Outlined briefly, these have been found to be the essential features of safety work:

1. To ascertain the actual condi-

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tions of risk under which employes perform each task and to determine the practical possibilities of eliminating or reducing this risk.

2. The provision of proper working conditions and of efficient safeguards for dangerous machinery and appliances.

3. Careful selection, instruction and supervision of workmen and their assignment to work for which they are best suited.

4. The promulgation and rigid enforcement of necessary rules for safe working.

5. The inculcation of habits of caution in the minds of all concerned.

You will readily appreciate that such a program calls for organized and not haphazard effort.

Statistics are of the utmost value in accident prevention. We must know what our problem is before we can solve it. We must know what accidents have occurred and how, if we are to prevent their recurrence.

Safety work proper is divided into two essential elements: Safeguarding and education, and both conducted under a well-planned scheme of organization. The importance of safeguarding has long been recognized, while that of education has only within recent years come to be appreciated as it should be. The comparative value of the two in solving the accident prevention problem has been the subject of much discussion, resulting at last, I feel sure, in a general belief that neither is sufficient unto itself, even in its own particular field, but is dependent upon the other for anything like complete fulfillment of its purpose. Both are dependent, either separately or together, upon that cordial co-operation between employer and employe which is obtainable only through organization.

It is impossible to prescribe a precise form of organization for any plant or group of plants without an intimate knowledge of conditions which would indicate what form is best adapted; but certain elements are essential in every form of organization. They number half a dozen and include a safety inspector, a central committee of safety, workmen's committees, certain activities for each foreman, meetings of foremen and comprehensive education of workmen. Permit me to devote a few words to each element.

Having a safety inspector does not necessarily mean that someone must be hired for this especial purpose. If the plant is not too large a safety engineer may perform duties in addition to his accident prevention work. There must be someone, however, either on whole or part time, in active charge of the details of safety work.

It is well to have the safety inspector act as the secretary of the Central Committee on Safety, which body should include also the plant superintendent or his assistant as chairman and three or four high-grade department superintendents or foremen. The Committee on Safety is the agency to originate and have general charge and supervision over safety work.

The workmen's committees should consist of three or five workmen, changed periodically. Each committee should make inspections and investigate accidents in their several departments, making written reports on both subjects.

The foreman should be held definitely responsible for the safety of his men and should be made to understand that the preventing of accidents is as much a part of his business as is the turning out of product. The importance of the active co-operation of the foreman in accident prevention work is so clearly recognized in some concerns that an "accident bogey," to use a golf term, is established for each department, and the foreman is awarded a bonus for accident reduction, varying in amount to his percentage in beating the "bogey."

Monthly meetings of foremen to discuss safety matters are an invaluable aid.

SAFEGUARDING REDUCES NUMBER AND SEVERITY OF ACCIDENTS—ITS EDUCATIONAL AND PSYCHOLOGICAL VALUE

Safeguarding alone, no matter how thoroughly it may be done, can never

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take care of more than a relatively small percentage of accidents, for ignorance and thoughtlessness in whole or in part are the causes of most accidents. Safeguards prevent many accidents, however, and they often tend to reduce the seriousness of mishaps which they cannot altogether avert. Their installation, moreover, has a very material influence upon the educational side of safety accomplishment, because the success of educational work depends finally upon the measure of co-operation obtained from the workmen, and this co-operation cannot well be expected unless the workmen have reason to believe that their employer is willing to do his full share in the joint effort which will inure to their common benefit. The tangible evidence given by safeguarding that the employer does not merely take a platonic interest in accident prevention, but is ready to spend his money to remove or lessen the hazards of dangerous machines and places, is the best possible guaranty of his good faith.

SAFEGUARDING ESPECIALLY IMPORTANT IN THE TEXTILE INDUSTRY

I have said that safeguarding cannot actually prevent more than a relatively small percentage of accidents, but it is well to remember that accident frequency does not necessarily mean accident severity. The smaller number of accidents preventable by safeguarding may mean more accident cost than the larger number preventable by other means. From the limited data as yet available, there are indications that the greater part of the direct cost of accidents must be eliminated by what is termed "engineering revision," which includes (besides what is known as mechanical safeguarding) design and location of buildings, arrangement of transportation facilities, proper means of access to every point where a worker must go, adequate lighting, removal of hazardous conditions, and the replacement (if necessary and possible) of dangerous machines.

Safeguarding is of special importance in the textile industry because of the amount and speed of the machinery used. In the State of Massachusetts, during one year, there were 573 gear accidents in cotton and woolen mills alone, or more than half of all the gear accidents reported in all the State's industries. The special machinery peculiar to cotton and woolen mills—such as openers, pickers, cards, spinning and drawing frames, slashers, looms, etc.,—caused 3,177 accidents during the same period of time.

Fatalities do not figure prominently in cotton mill risks. The fact that your industry is not so susceptible to these most serious accidents makes your task of prevention the easier, but it does not lessen the need for it. During the year in question the chief mechanical elements in all mills—viz., belting, shafting and gearing—caused three times as much lost time per employe in the cotton mills of Massachusetts as in the thirteen other leading industries of the State and the element of gearing alone was four and one-half times as dangerous.

I will not venture into a discussion of the hazards of your peculiar machines—the beaters of your pickers, the cylinders of your cards, or such things—but I do want to recall to your attention the need for interlocking guards. Textile machinery has a peculiar element of danger in the fact that "flyings," so commonly present in textile machine operations, tend to collect on moving parts and to necessitate frequent cleaning. There is a constant temptation to clean the machinery while it is in motion, and the provision of ordinary guards—not interlocked with the starting mechanism—in many cases is insufficient.

I do not believe it is possible to provide interlocking guards immediately for all equipment now in place. The more of it that can be done the better, of course. It is possible, however, to have the new equipment that is ordered from time to time so equipped.

BEST TIME TO GUARD MACHINES IS WHEN THEY ARE BUILT

The best time to provide for mechanical guards, and to meet many

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other safety conditions, is when the machines are being built or the plant is being planned, but unfortunately much safeguarding is still an afterthought. This can be avoided to a large extent by a careful checking of plans and specifications for new machinery and equipment, and, perhaps in a more limited degree, when providing for new construction, and for alterations, repairs and rearrangements.

The matter of having new machinery properly safeguarded before it is delivered is quite directly up to the men who are in charge of mill work. The employer—the man who signs the checks—will be guided largely by their advice and suggestion. The manager in charge is supposed to know the requirements of his mill and it is up to him whether he gets safe machinery or not.

The actual provision for safeguards must be approached in a truly scientific manner, if real results are to follow their installation. Only a careful study of working conditions, a painstaking analysis of accidents occurring under them, and a searching inquiry into potential causes of "near accidents" that may not have actually resulted in loss of time or injury to workmen or equipment will truly determine the hazards to which workmen are exposed and indicate the correct means of overcoming them. No remedy can be effective which is based upon a wrong diagnosis.

"THE MAN ON THE JOB"

There is no better way of assuring oneself that a safeguard will be thoroughly practical, will fulfill both of its functions—that of effect and that of appeal—than to enlist the aid of the men on the job, the foreman and the workman. No one else knows so well the true risks of the work involved, the ways in which these risks lead to accident, and the manner in which they can be avoided with least interference with the work. And there is a psychological result of such co-operation, the value of which cannot well be overestimated. If the man on the job feels that he has actually had a real part, even though a small one, in the provision of a safeguard for work which he is doing, or which is being done under his supervision, he is pretty sure to use it or to see that it is used. He comes to look upon it as his guard and naturally to take the keenest interest in its maintenance and use.

It is co-operation, indeed, which is the basis of all really effective safety work, of safeguarding as well as of organization and education.

Keeping the men interested is a real problem. To energize a safety campaign is relatively simple, compared with the constant re-energizing of it which is so vitally essential. You must be an advertiser, not blatantly but persistently. The familiar saying "It pays to advertise" applies nowhere better than in safety work. You must, in fact, make use of the same principles in reaching your men that the successful advertiser employs in business.

At first the whole idea of safety is new to your men. It must be brought home to them and then incessantly kept home, just as is the trade name of a well-known concern or the trademark of a well-known brand of goods.

The bulletin board, if properly used, is a great means for safety advertising, but you can well begin even before that. You can have at your employment office a sign telling men they are not wanted unless they will be careful of their own and others' safety.

Facts about accidents should be brought forcefully to the attention of both employer and workmen. Photographs, stories and reports, all should be made use of—prepared in a form that is graphic and interesting, grewsome and gripping. The employer must feel the cost of accidents and appreciate that they are a serious leak in his business. The workmen must be made to see that accidents do happen, no matter how immune they may individually consider themselves, and it must be made clear to them how accidents happen and how they can be avoided.

CO-OPERATION OF THE MEN

The co-operation of the workmen is even more essential than that of the

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employer. No matter how much interest the employer may take, no matter how much aid he may give, it is upon the attitude of the men, in the last analysis, that the greater need of accident prevention depends.

I shall not attempt to outline the many ways of obtaining the co-operation of the men, but no talk on safety would be worth its salt which did not emphasize upon workmen's safety committees. There is no better way of arousing the interest of the men in a plant than by instituting such committees as a leading feature of your safety organization.

Men who serve upon workmen's committees come to have a clearer understanding of the accident prevention problem than they could achieve in any other way and become the finest sort of missionaries among the workmen generally.

Some of you have thought, both in the past and while I have been talking about workmen's safety committees, that two conditions in your plants make workmen's committees difficult if not altogether impracticable. I refer, of course, to the large percentage of foreign labor and the perhaps even larger percentage of women and youthful persons employed. It does not seem to me that either of these conditions makes the task impossible. Of all concerns doing systematic safety work the United States Steel Corporation was one of the earliest to undertake the work, and it has met with as much success as any other concern, yet the corporation has been up against this same problem of foreign labor. In some of its mills it has had to cope with something like seventeen languages and dialects. The Steel Corporation originated the workmen's safety committee and attributes to it a great part of its success in reducing the number of accidents in its plants.

Nor do I believe that your other difficulty, that of having so many women and young persons among your employes, is an insuperable obstacle to the success of workmen's committees. I think women can be induced to take a greater interest in safety than men.

THE SAFETY HABIT

One of the pioneers in safety work struck the keynote when he said that "The best safety device is a safe man." Another has put it that the greatest factor operating toward the prevention of accidents is not the prevention device but the "prevention spirit." The safety slogan which has the strongest appeal to me is "Get the safety habit." There is a lot of meaning in that phrase.

I do not think I exaggerate in making the statement that promoting the safety habit—getting the men to think safety and to think it unconsciously—is the biggest thing to be done in safety work, and the most difficult. It is the leading feature of the general educational work which is the keynote of all successful accident prevention campaigns.

RULES AND DISCIPLINE

Great care should be taken in the framing of rules and they should be as few as possible. Discipline should always be a last resort. Of course, every rule that is made should be rigidly enforced, otherwise no rule will command respect. A great aid in securing obedience to a rule is, before promulgating it, to get some leading men in the work affected—if possible a majority of all the men—to follow the desired practice. Their example, procured by a combination of suggestion, education and persuasion, will obviate much of the need for coercive measures.

The ways of educating workmen into the safety habit are almost innumerable. Practically every step taken in safety work has its part in this education, and it is well to keep this fact clearly in mind. The provision of safe working places and safe tools is a feature of education as well as a direct means of preventing accidents. So, too, and most notably, is the formation of the workmen's committee.

Safety engineering is really human engineering and the only way to get anything like the full measure of results is to obtain the sympathetic co-

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operation of every man in the plant. You cannot get a full co-operation of workmen by preaching to them, but you can get it by a sympathetic method of arousing their interest. They must be shown, and one of the best ways of showing them is to let the facts—of risks, of accidents, and of other shops' experience—speak for themselves through films, photographs, slides, exhibits, etc. A well-conducted bulletin board is one of the most potent aids.

The one man in whom you should be supremely interested is the foreman. If you can interest him, if you can help him to see clearly the causes and remedies of accidents, if you can make him feel that accident prevention is worth while, I venture to say that three-quarters of your entire work is accomplished.

Of course, you are familiar with every nook and corner of your plant—you are continually on the lookout for hazards. If you are close to your foreman and have been able to make him your friend, an offhand suggestion to him as to how he can improve his department from the safety standpoint will have the best effect. The more of this verbal correction the better.

SELECTION AND ASSIGNMENT OF MEN

Just one more feature of accident prevention, and a very important one. This concerns itself with the selection of men for work and their personal instruction. Too little attention, from the safety standpoint, is often given to these matters. To put a heavy, slow-thinking man on a job requiring bodily agility and mental alertness, or vice versa, is simply inviting inefficiency and accident. So, too, is assigning a man to a duty without carefully instructing him how to perform his work safely as well as otherwise efficiently. Every man who is new on a job should be carefully instructed in general safety as well as in the safe way of doing his particular work. Especial pains should be taken with the immigrant and with all non-English-speaking men.

Here, too, our friend, the foreman, is indispensable. He is in the best position to see that his men are properly instructed in safe practices as well as in their particular work.

AFTER-THE-WAR CHANGES

In closing, I want to say a few words about the broader aspects of safety work. The conservation of man-power in industry is not merely a matter of selfish concern to industry. Upon it depends in large part our success in the war which we are waging for our own liberty and the freedom of men.

The tremendous upheaval which the world is now undergoing, in its ultimate effects, cannot be restricted to readjustments of national boundaries and to racial groupings of peoples, not even to a determination of the question of whether the world shall be made safe for democracy, as we have hitherto understood democracy to mean. The whole structure of society is being shaken to its very foundations and when armed strife ceases and the time for rebuilding comes the work must proceed in the light of a new understanding of the relations of man to man.

The employer who has had the foresight to engage in genuine safety work will find himself at a distinct advantage when the time comes to meet these new conditions.

There is nothing which brings men to a clearer understanding of each other in all ways than for them to meet face to face and work shoulder to shoulder in one way. Given one common ground of contact, others are bound to follow.

Permit me to dwell for a moment upon this essential, the brotherhood of man, as an active influence toward safety work. However much we may emphasize the selfish side of accident prevention—its economic value and the wise foresight which it exemplifies—whatever importance we may attach to it as a patriotic duty, present and future, we cannot fail to feel that underlying it all is that idea of altruism without which life lacks an element of sweetness, a touch of brotherly love, and an abiding sense that a man is of more value than a machine.

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Fire Destroyed Valuable Records

New York Board of Education Learns an Elementary Lesson

THE wisdom of keeping valuable records such as accounts, deeds, drawings, plans, manuscripts, etc., in containers that possess a high degree of heat resistance, should be obvious to every intelligent person, for if they are not so housed, but are placed in wooden or uninsulated steel files they will meet destruction, in all probability, if a fire of any severity reaches the containers.

It is impossible to estimate the enormous loss which America suffers each year from the destruction by fire of valuable papers, records, documents, etc. This loss is not included in fire-loss figures because all such papers and records are uninsurable and, therefore, do not figure in the losses reported by insurance companies. A document may be worth a large sum of money to the owner and its destruction may represent a bigger loss than the insured property loss. The practice of permitting papers and documents of great value to be unprotected from fire-destruction, especially public documents, is one of the worst faults of the American people, and is in direct opposition to all economic practice. It indicates a disregard of ordinary prudence and common sense that is well nigh incomprehensible.

Photo by Social Press Association, N. Y.

Photo by Social Press Association, N. Y.

The records kept for "preservation" in these inflammable filing cases are said to have been extremely valuable

The photographs shown herewith illustrate the carelessness of the Board of Education, New York City, in keeping its records. Fire visited the Board of Education, on February 1, with the disastrous results to its records shown

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Photo by Social Press Association, N. Y.

in the pictures. As will be seen, the containers were of wood and sheet metal, which were incapable of providing the heat resistance needed to preserve their contents, with the result that the plans and records of the Building Bureau were totally destroyed. Had these records been kept in insulated steel containers possessing a high degree of heat resistance they would have been saved in all probability.

This is a typical instance of the price that must be paid for neglecting to provide adequate fire-resistance for the preservation of valuable records, which, often, cannot be replaced.

Photo by Social Press Association, N. Y.

The losses of records, indicated by above pictures, suffered by the New York Board of Education in the fire of February 1, 1918, will serve as an "education" for the Board and also for other public functionaries, whose official records are worth money

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Safety Problems in Handling Freight

By Marcus A. Dow

Safety Agent New York Central Lines

At the March meeting of the New York Local Council of the National Safety Council, the topic was "Safety Problems in Handling Materials and Supplies, by Hand, Trucking and Piling." Mr. Dow introduced the subject and stated that, in 1916, 30 per cent of all injuries to employes of the New York Central Railroad were from this cause. Wherever freight is handled there is danger of accidents unless safe practices are pursued. To illustrate typical examples of such accidents, Mr. Dow selected reports of 21 accidents which have occurred on the New York Central.

NO. 1. A freight handler working on freight house platform was engaged in unloading steel bars from a truck. While removing one of the bars from the pile on the truck, another bar slipped off the pile on the truck and landed on the left foot of the employe, causing a broken instep.

No. 2. A car was standing on siding, and piled alongside the car were several castings weighing about 700 lbs. each, which had been removed from the car. There was a 16-foot ladder behind the castings. While attempting to pull the ladder out from behind the castings one of them rolled down on to the man's left leg, severely bruising it between knee and ankle.

No. 3. A section gang was carrying a 33-foot steel rail. The regular foreman had quit his job and the men were in charge of the straw boss, a Greek, who apparently did not have the qualities of a good leader. The result was some men suggested handling the rail a certain way and some another, one member of the gang suggesting carrying the rail farther, and a man at the opposite end shouted to throw it; some swung the rail for a throw and some did not, with the result that one end struck the ground first and the other end dropped down catching the instep of one of the men, fracturing his foot.

No. 4. Four freight handlers were engaged in removing boiler heads from car to freight house platform. Three of these boiler heads were in the car leaning against a half barrel of paint. When the first boiler head was removed by the men it was found it would not go through the door in upright position, so they allowed it to lean back momentarily and rested it against the remaining two pieces resting against the barrel, and when they did so it slid along the floor and caught the leg of one of the freight handlers pinning it against the door jamb, breaking both bones near the ankle.

No. 5. Several freight handlers were attempting to move a heavy piece of machinery, which had wooden skids fastened to the bottom so that rollers could be used in moving it. These men took a 2-wheeled truck and placed the shoe of the truck under the edge of the skid and then bore down on the handles of the truck to pry the machine up so as to get the rollers underneath. The shoe of the truck slipped out from under the skid causing the men to fall in a heap, one man falling on another, breaking his leg. Evidently if a bar had been used to pry the machine up instead of the truck, the accident would not have occurred.

No. 6. At a certain transfer house a number of tracks parallel each other. Cars are placed on each of these tracks for unloading. On a certain occasion the cars were not spotted so that the doors of the cars were exactly opposite each other. A trucker was handling a bale of cotton, and in passing through from one car to the other was obliged to make various turns over the transfer planks between cars. He stepped off the edge of one of the planks and fell, and the bale of cotton came on top of him. He was permanently injured.

No. 7. A trucker was removing

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some cases from freight house, which cases were standing near an open door. It was raining, and the floor was wet. While endeavoring to put his hand truck under the case he slipped on the wet floor and the truck and load fell on him and fractured his hip.

No. 8. A laborer at an engine house was assisting to lift a grate from the floor of roundhouse to deck of engine, and strained his back so that he lost 38 days from work.

No. 9. A brakeman was wheeling a 4-wheeled truck loaded with flour from freight platform into a car. He did not take the time to secure the plank; the plank slipped, causing him to fall between car and platform with the load, fracturing his leg.

No. 10. At a certain freight house a number of wheels were carelessly piled against each other, and when a truck passed by, jarring the floor, one of the wheels fell over catching the freight trucker and crushing his foot.

No. 11. Two men were moving a hand truck through a freight house, one pushing, the other pulling. The front wheels of truck struck a plank that was lying on the floor. The two men made an extra effort and the front wheels of the truck mounted the plank, went over it, and as they came down on the other side one of the wheels struck the forward man on the back of his foot, bending the foot and tearing the ligaments loose, necessitating a 6 weeks' lay-off from work.

No. 12. In another freight house two freight handlers were trucking a box weighing about 700 lbs. on a 2-wheeled hand truck. Each man had hold of one handle of the truck. When it came to setting the truck down preparatory to unloading it, one man dropped his handle quickly; the other man, noticing the box was marked "Handle With Care," tried to ease it down, and when the first man let go the entire strain of the load was on this man's hands, and his left hand was so strained that the skin was torn and pulled loose at the joints of the fingers, and also in the palm, requiring the services of a surgeon and necessitating 25 days' lost time.

No. 13. A freight handler was removing a heavy bar of steel from a truck, and one end of the bar was resting on the chisel of truck. The bar of steel slipped on the chisel of the truck, catching the handler's foot between the bar and the wall, badly cutting and bruising the foot. Steel on steel will slip, and a piece of wood placed between would have avoided this slipping.

No. 14. A coal dock laborer was unloading coal from a hopper bottom car. Instead of standing on a plank across the top of the car he stood on the coal, using a bar to pry the coal and get it started. The coal started through the hopper bottom very suddenly, carrying the man with it and severely injuring him.

No. 15. A baggageman in a passenger station pulled a trunk off a truck, allowing the opposite end of the trunk to drop to the ground, and it landed on his foot, mashing his toes. Lost 7 days.

No. 16. A freight house man unloading a roll of cable from a car, rolled the cable against the door post and caught his hand between roll and door post, mashing it. Lost 11 days.

No. 17. A track laborer was pulling a tie from a pile with a pair of tongs. The tongs slipped off the tie he was pulling and his wrist struck another tie, breaking the wrist.

No. 18. A freight house handler was lowering a box of toy torpedoes from a pile to the floor; he dropped the box when about a foot from the floor which caused the torpedoes to explode, destroying the sight of his right eye and badly lacerating two fingers of his right hand. The box was packed in compliance with Interstate Commerce Commission regulations, and stenciled "Torpedoes—Special Fire Works—Handle Carefully—Keep Fire Away."

No. 19. Several men in a locomotive erecting shop were rolling a driving wheel about 5 ft. high from the wheel lathe to a point where it was to be handled by the electric crane. The wheel struck some small obstruction on the floor, and the men holding up the wheel, who were grouped on either

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side of it, evidently became confused, and when it started to lean over they let go and scattered; it fell on one of the men, pinning him down, inflicting internal injuries from which he died.

No. 20. A freight house trucker while trucking a long piece of iron pipe weighing about 500 lbs., which was lying lengthwise on the truck, started to make a turn, when the pipe rolled off the truck and one end struck his right foot, smashing the right toe.

No. 21. A gang of workmen in a locomotive repair shop were lifting a tire, when it fell to the floor striking a piece of loose plank which flew up and struck one of the workmen on the left hip, inflicting a severe wound which caused 6 weeks' disability and much suffering.

Uniform Accident Statistics

By G. G. Kingsley

Safety Engineer, Halcomb Steel Company, Syracuse

ACCIDENT statistics are considered by many to be the dryest, least comprehensive and most uninteresting part of the accident prevention problem. I do not doubt that they are, if kept as a great many records are kept, without regard to accuracy and with no real basis for the determination of comparative results. If they are the dryest, they are one of the most necessary parts of a successful safety organization, be it insurance, manufacturers' or State, for they measure results.

I think all will concede that an accurate accident record, with results figured on the basis of a tangible unit of measure, is one of the prime requisites for the establishment of a safety department. To say that so many accidents happened per 100 employes does not mean a thing, for in all probability the number of employes is only averaged or the number of employes at the end of the unit period is used to figure the frequency. Yet this is the way the accident records are kept in a majority of cases and the severity of the accident is very rarely taken into account.

The object of keeping accident records is to measure the results of safety work through organized effort. What is the use of measuring if one does not measure correctly? The report of the Committee on Statistics and Compensation Insurance Boards and Commissions, in the *Monthly Review* of October, 1917, gives some very sound and illuminating opinions as to how accident statistics should be kept, and shows us how to measure accidents, using an accurate unit of measure, the 300-day worker.

The 300-day worker is defined as one who works 300 days a year for 10 hours a day, or 3,000 hours a year.

An example will best illustrate the use of the 300-day worker as a unit of measure. It is determined that a plant works 300,000 hours per unit of time. That is, if one man did all the work it would require 300,000 hours for him to do it in the unit period. It is also the sum of the actual number of hours worked by all men in the plant. Divide this by 3,000 hours, the unit of measure, and you have one hundred 300-day workers. There may have been an average number of 275 or 350 employes for the unit period, but there can only be a certain number of 300-day workers. Suppose there have been 10 lost-time accidents during the year. The number of 300-day workers, 100, divided by the number of accidents, 10, will give you the accident frequency of 10 for every one hundred 300-day workers. Again, suppose that 250 hours were lost as a result of the 10 accidents; 250 hours, divided by the number of 300-day workers, gives us 2.5 hours lost per 300-day worker, which is the severity rate. Don't you see that all figures are based on the 300-day worker, and that the 300-day worker is a very convenient and accurate unit of measure?

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Using the above method of figuring accident rates, the results will be comparable from month to month or from year to year as the case may be, and one will be able to note the progress made without the fear that he is "kidding himself along."

Why should not the State adopt a standard method for keeping accident records? It is no more trouble to keep them in one way than it is in another. As the Standard Cost System adopted by the American railways enables them to measure their efficiency and show the result of their efforts in a comparative way, so would a Standard Accident Statistical System adopted by the State or Nation enable us to measure our results in an accurate and comparative way.

If standard accident statistical methods were adopted, one can see that if one plant manufacturing the same article as another had a better accident record than the other, it would know that the results were obtained by using the same method and the same unit of measure. This would enable the concern having the low record to compare figures and investigate and find out wherein it was lax and to remedy the laxity as found.

We have tried out the foregoing method of keeping our accident record and up to date we find that it is highly satisfactory. It will enable us to use these figures in figuring the accident efficiency for our various departments, knowing that we are not working an injustice by having our results computed on a false basis. It will also enable us to compare our results with those obtained by the Government in its research work.

I believe it is entirely within the scope of SAFETY ENGINEERING to handle a discussion on this subject, and believe that through SAFETY ENGINEERING we may shed new light upon this important subject of "Uniform Statistics of Accidents."

[Communications on this subject are invited—EDITOR.]

Beware of Empty Gasoline Tanks

From Technical Paper 174, *Bureau of Mines, by R. H. Kudlich and Edwin Higgins*

SEEMINGLY empty gasoline cans or tanks are probably more dangerous than those filled with gasoline. Usually the can will not be entirely emptied and the remaining gasoline will vaporize, the vapor will mix with the air in the can, and the mixture may easily be explosive. When the can is being filled this mixture is forced out by the gasoline, and may explode if ignited by a flame or spark near the opening.

Many engines are built with cavities or inclosed spaces in the crank case, base, or some other part, and these may be full of gasoline vapors. When inspecting or making repairs with an open light, men have been severely burned when the light vapors ignited.

To guard against such accidents all cavities should be blown out with compressed air or steam. If neither is available the cover should be removed, the vapors fanned out, and a lighted lamp or candle, attached to a stick, passed around inside the cavities to burn out any vapors that may remain in the cavities.

Unless an ample current of air at considerable velocity is passing, gasoline should not be used to clean an engine or other machinery. Even if there is sufficient air to sweep away the vapors as soon as they are given off, open lights should always be kept at a safe distance and on the intake side so that the vapor cannot be carried to the light.

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The "Lay-Off" System as a Means of Discipline

By S. C. Dickinson

Safety Engineer, Arizona State Bureau of Mines

THE lay-off system is the best system to acquire a trained force of men, and unless men are trained to be careful, safety work will never be a success. Our records show that at least 75 per cent of our accidents have occurred in a supposedly safe place of work, but the man injured had been careless. I believe the only method of preventing such accidents is to lay a man off for a few days when caught working under such conditions, and I also believe that inside of six months, if the bosses are very strict along the lines of safety and use the lay-off system, they will have trained men and their accidents will be reduced almost to a minimum. This fact has already been proven by some of our best shift-bosses and these bosses are much more liked by their men than others who severely criticize their men when found working under such conditions. "Bawling a man out," as the miners term it, is a thing of the past and if a shift boss is not up-to-date in this respect he should not be a shift boss for he will continually have accidents caused by getting his men angry and excited.

2. Workmen should be reached through persuasive, rather than through mandatory methods. The foreman should show the workman why he should obey any rule, and the danger to himself and other employes if he disobeys. The foreman should reason with his workmen through the art of suggestion, making the workmen freely admit the desirability of any rule. Workmen should be especially warned not to remove safeguards before the machinery is put in operation. Foremen should watch to see if their instructions are obeyed. If a workman continues to disobey instructions, he should be brought before the superintendent and manager for serious talk. If he continues to willfully disobey instructions, he should then be discharged.

3. Rules have been compiled and printed in several languages. Each man is given a copy and any shift boss detecting an infraction of the rules is instructed to lay the man off for 7 to 14 days as he deems best. This hits the man where it hurts most—in the pocket-book—and other than that the idea is taken home. This rule alone has done more to promote safety than any 5 rules.

4. In my opinion some system of discipline is absolutely necessary to enforce the observance of safety rules. The disciplinary system should be in the hands of the operating department, not the safety organization.

With us an employe committing his first offense is generally given a reprimand; the second time a lay-off of from one to 15 days, depending upon the importance of the rule broken; the last offense calling for the man's discharge. That this system is considered no great hardship on the men, and one that the company is justified in using, will be realized when I state that our safety committeemen have on several occasions tried to introduce a more severe system.

5. I am heartily in favor of the lay-off system as a means of training men to protect themselves. I believe that it is the only system that will prevent a repetition of a dangerous practice.

The only disadvantage that I can see to the system is that in laying off an old man, a new man unfamiliar with the working place, location of tools, etc., must be put on in his place. This means that time must be taken by

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the boss to give the new man instructions.

I do not believe that warning a man of a dangerous practice or threatening a man with discharge does any good. It may cause him to be careful for a few days or when the boss is around, but it does not stop him. He soon gets the idea that he won't be fired even if he does disobey the rules or continues a dangerous practice and pays no attention to instructions.

Give a man warning the first time, a lay-off the second time and discharge him the third time. The first offense may be through ignorance, but no excuse can be made for a repetition of the offense. Lay a man off or discharge him and you are hitting him in the pocket-book. That is where he is hit the hardest and will make him think several times before repeating the offense.

6. In the working of men, especially in mines, where there is an element of risk and where several hundred men are scattered over a large area of ground with one shifter to supervise each 35 to 50 men whom he is unable to see more than twice a day, real efficiency and safety work can be obtained only by the existence in the men of the spirit of fairness, loyalty and conscientiousness, and the degree of such spirit depends upon the bossing system in use.

Certainly the discharge system, which introduces a continual stream of new men (who, no doubt, have been discharged at some other shaft) into the mine who are unfamiliar with the working places and conditions, the working tools and the methods of supervision, does not promote efficiency or safety. Nor does such a system engender a spirit of fairness, loyalty and conscientiousness in the minds of those who are discharged and who go elsewhere to secure work.

Any system that will get rid of the continual flow into the mine of new men unfamiliar with the working places, the working conditions, the bosses and their system of supervision, and will keep the men definitely employed once they have proven to be intelligent and conscientious, will promote not only safety, but also raise the quantity and quality of the work done by each employe and reduce the number of accidents and lawsuits to the company, as well as add to the security, prosperity and contentment of the men employed.

I believe that a lay-off system, after a man has proven his worth and intelligence, together with the paying of each man underground a daily wage bonus after six months continuous employment, and an extra bonus for each six months additional continuous employment without a lay-off for breach of rules, etc., would promote the interest of safety and result in profit both to the miners and the company.

The only weak point in such a system would be the opportunity for favoritism to be shown by the bosses. However, a proper cost and supervising system would take care of that point.

Also to eliminate the personality in bossing, a report could be required by the manager or superintendent explaining the reason for the discharge of any man after being in the service of the company more than six months.

7. Experience has shown that it is better to discharge outright an employe in any instance where even a single overt act of gross carelessness on his part is or might have been responsible for serious accident, or in cases where it is found from records that an employe is habitually careless. With some men a lay-off might be sufficient penalty to cause them to be more observing but the personal equation enters so largely into the matter that it is hardly possible to say whether or not such a rule would be effective. The man who is addicted to carelessness as a habit probably would not care, or in other words, would be "careless" over a few days' loss of time because of his carelessness. On the other hand, there are men who could be induced to cultivate the habit of being cautious if they were forced to suffer personal financial loss of a few days' time for every failure to observe warning signs or signals or for every

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lapse of carelessness. Where such discipline can be rigidly enforced and advertised that is, where every instance of such lay-off and the cause therefor can be brought to the attention of all workmen on the plant, it is possible that it will accomplish much in the promotion of personal caution. But such a rule, when made general is apt to be more honored in its infraction than in its observance, because foremen will not always waive their personal prejudices where a particular friend or favored workman is involved. In my opinion, environment, local conditions and the personnel, management and men, are factors of sufficient importance to preclude the application of a general rule and to force upon each individual employer the necessity of deciding the merits of a lay-off system in training employes to be careful.

8. Some men take advantage of safety work by taking considerable time to do a piece of work and offering as an excuse that they have been working to make the place safe. Of course, this cannot occur very often without causing the person in charge to have suspicion. Men of this character ought to be discharged because they are undesirable to the employer and to the honest employe. For disregarding rules, etc., the lay-off system will teach them a lesson which will not be easily forgotten. If they wait and return to work it is a good indication that they intend to stay for a while and that they will use better judgment in the future. If they don't return to work it is a very good indication that their stay would be of short duration, so that change is just as well made then as a little later. If they go to another place to work they will remember their lay-off and do their best to observe the safety rules of their new employer.

The lay-off rule if applied properly, regardless of what the infraction is or who the person is, will prove to be the most popular rule in promoting "Safety First" in mines, providing the personnel is more or less permanent. If the mine is known as a "10-day mine" the rule will have absolutely no value in accident reduction.

Revised Ten Commandments

By G. M. Wallace

American Locomotive Company

1. Unto him who removeth a guard shall rest be given from his labors.

2. If thou thinkest "Safety First," thou thinkest well, for unto thee is given the power to think properly.

3. If in the midst of thy labors thou givest counsel to fellow workmen regarding dangers, thou hast kept the Golden Rule—"Safety First."

4. He that sneereth at Safety improvements laggeth behind in the march of progress. To him all men turneth the cold shoulder.

5. To him that looketh to the future and thinketh "Safety First," all shall be given—eyes to see, hands to labor, ears to hear, limbs to speed him on his way—health to perform his daily tasks.

6. Of him that endangereth his fellow-workmen knowingly an example shall be made—he shall be removed from the honor roll, and the pay roll.

7. Unto thee is given sight. Close not the windows of thy soul, nor lose the beauties of Nature by failing to wear goggles.

8. To eat well, to sleep well, to spread broadcast the doctrine of "Safety First"—of him who doeth these all praises shall be sung.

9. By-paths that wander off into No Man's Land shalt thou avoid, but follow the straight path of "Safety First" to Success.

10. Allow thy Safety Light to shine and hide it not beneath thy cloak —one single ray may pierce the gloom, changing the entire world for thy fellowmen.

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Rochester: What a City Can Do in Safety Work

FOR five years the Rochester Chamber of Commerce has been conducting an extensive and intensive campaign of fire and accident prevention. It is now a comparatively easy matter to conduct an effective local celebration of the two movements. The fact that they have been accompanied by a reduction of approximately 42 per cent in the city's annual fire loss and fewer accidents throughout Rochester, especially in the factories, justifies their gratifying popularity. There should be no insurmountable difficulty in the way of similar success in other communities.

THE WAY ROCHESTER DID IT

Typical of the attention Rochester gives annually to the observance of the National Fire and Accident Prevention Day, was the public program on October 9, 1916, an account of which has been prepared for this number of SAFETY ENGINEERING as an example that may be followed by other cities with good effect to the municipalities and the Nation:

"The day was observed in the churches, the public and parochial schools and by a big public fire and accident prevention show.

"The success of the celebration was due largely to the valuable co-operation of the Mayor, the president of the board of education, the bishop of the Rochester diocese of the Roman Catholic Church, the superintendent of public schools, the president of the Rochester Ministerial Union, the president of the Central Trades and Labor Council, the scout commissioner of the Rochester Council of Boy Scouts of America, the commissioner of public safety, the chief of the fire department, and the chief of the police department. The Rochester newspapers gave generously and liberally of their support.

"The leading churches responded to the chamber's circular appeal to observe a 'Fire and Accident Prevention Sunday' on October 8, and brought the day to the attention of their people in some way. Sermons on both movements marked the observance in some churches. Editorial comment appeared in many church papers.

"The many requests made upon the Chamber for speakers at special exercises in the schools attested to the progress and popularity of the campaign in those quarters. All of the speakers cited the following figures: Deaths of children under 10 years of age in United States for a period of five years: burns, 14,471, nearly 8 per day; drowning, 4,423, over 2 per day; falls, 3,916, nearly 2 per day; railroads, 1,086, 1 each 2 days; street railways, 1,221, 1 each 2 days; automobiles, 1,901, nearly 1 per day; other vehicles, 2,199, over 1 per day; all ages, total deaths, 1915, trespassing on railroads, 5,084.

"About 3,000 people attended the Public Fire and Accident Prevention Show at Convention Hall. It had been the experience of the Chamber's safety council that by advertising it as a show instead of a rally or big public mass meeting larger attendances and livelier interest followed. The latter titles are not linked in the public mind with especially joyous affairs and have not the proper appeal of the former. Newspaper notices, posters in factories and admission tickets in the previous pay day envelopes of factory employes constituted effective advertising. Fifty thousand of the latter were distributed, which in itself brought the day directly to the attention of five-sixths of all of Rochester's factory employes. The program was made up of motion pictures, music and speaking. Previous experience made it advisable to feature the motion pictures strongly. They were not dry, technical films, but mixed love, adventure, 'Safety First' and fire prevention in the right proportions. 'The House That Jack

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Built,' two lively accident prevention reels by the New York Central; 'The Locked Door,' a convincing and thrilling fire prevention film by the General Film Company; and a 'Krazy Kat and Ignatz Mouse' comic cartoon film, comprised the motion picture part of the program. There was the usual motion picture theater orchestra. The speakers were C. W. Price, of Chicago, field secretary of the National Safety Council, and Ernest Palmer, of Chicago, assistant general counsel of the National Board of Fire Underwriters. Mr. Palmer spoke on 'The Nation's Fire Waste.' Mr. Price spoke on 'What Accidents Cost the Workmen.'

"The show was opened with a film to permit the big crowd to become settled before the first speaker began. A comic cartoon, shortly after 10 o'clock, ended the meeting because temperance is wise—even in fire and accident prevention. A film of that nature thoroughly rounded out an altogether enjoyable evening.

"The success of the entire celebration resided in the co-operation secured from all quarters, which could not have been bought at any price.

"The mayor gave his support through a proclamation published in the newspapers.

"This resolution was adopted by the Central Trades and Labor Council of Rochester and vicinity and was published:

"'WHEREAS: National Fire and Accident Prevention Day will be conducted October 9, 1916, by the Nationl Fire Protection Association and the National Safety Council and

"'WHEREAS: The National Fire Protection Association and the National Safety Council have delegated the Rochester Chamber of Commerce to take charge of the celebration of the day in Rochester, and

"'WHEREAS: The wonderful results of the accident prevention and fire prevention campaigns in the factories, homes and streets of Rochester prove them to be humanitarian effort of great practical value, therefore, be it

"'RESOLVED: That the Central Trades and Labor Council of Rochester and vicinity heartily approves of the work that is being done and hereby pledges its moral and active support to it, and be it further

"'RESOLVED: That the Central Trades and Labor Council of Rochester and vicinity hereby commends to every employe and the general public of Rochester, the National Fire and Accident Prevention Day, October 9, and urges unstinted co-operation to make its celebration in Rochester a success.'

"Through Mr. Brown, the Rochester Ministerial Union expressed its commendation in the following excerpt of his letter to Secretary Woodward of the Rochester Chamber of Commerce:

"'I am writing to assure you of my great interest as a citizen and also as president of the Rochester Ministerial Union in the coming National Fire and Accident Prevention Day, which is scheduled for Monday, October 9. I will call it to the attention of the Union and it will also receive proper recognition in the announcements in our own church. You can count on me to co-operate in every way possible.'

"Through the courtesy of the street railway and lighting companies, motion picture theaters and downtown hotels, the day was advertised by posters on the fronts of street cars, a big electric sign, slides on the screen, and a suitable caption on menus, respectively. Strong support was given by the editorial and news departments of all the papers."

NEW SIX MONTHS' CAMPAIGN IN ROCHESTER

Julien H. Harvey, superintendent of efficiency of the Kansas City Railways Company, has resigned to accept the management of a public safety campaign now being inaugurated by the Rochester Chamber of Commerce and the local safety council. The campaign will last six months, from March 1 to September 1, and will be conducted with the co-operation of the National Safety Council. It is the most comprehensive effort at public safety work that has been undertaken by any community and is expected to provide an example for safety work throughout the United States.

Mr. Harvey has been for 15 years with the Kansas City Railways Company, starting as time-keeper, progressing through the positions of chief time-keeper, secretary to the president, superintendent of employment, division superintendent, and superintendent of efficiency. The last named office he has held two years during which he organized and established the com-

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pany's safety work, its power saving system, its welfare building and loans, and similar enterprises in behalf of the employes, made general studies and established programs for the promotion of efficiency in operating maintenance and administrative departments of the company. This work is now going forward in the hands of superintendents in such departments and is proving a very profitable feature of the company's activities as well as promoting expedition and efficiency in the work.

Mr. Harvey was one of the organizers of the Kansas City Safety Council two years ago and served two terms as president. He declined a re-election as president because of duties connected with work of the National Safety Council. He has served one year as secretary of the Street Railways Division of the National Safety Council and last fall was elected chairman of that section. Mr. Harvey is also a member of the executive committee of the National Safety Council. He had been chairman of the Public Safety Committee of the Kansas City Local Council and chairman of that branch of the work of the Kansas City Chamber of Commerce.

The national importance of the Rochester work demanded a man of Mr. Harvey's special experience and equipment. The urgent request of officers of the National Council and the invitation from Rochester overcame Mr. Harvey's personal predilection for residence in Kansas City and his desire to go ahead with work so well started for safety in that growing, western city.

"Please Help the Blind"—To Be Wise, Before They Lose Their Eyes

SHOULD an explosion of metal occur in a furnace, the Raritan Copper Company's safety engineer observes, every man in the vicinity would run to save himself from injury, but the same men, left to their own devices, in breaking slag, would fail to wear safety goggles, although the possibility of injury would be just as apparent and real as in the explosion.

The spectacular effect of molten copper flying through space awakens the dormant instinct which the flying particles of cold slag under the commonplace blows of the sledge hammer fail to excite.

It, therefore, devolves upon the foreman to make the working place as safe as humanly possible and to permit no man to work for him whose power to perceive the inherent danger in his work has not been awakened by constant drilling and explanation.

The conscientious foreman is the one big factor in preventing unnecessary injury. The price of safety is eternal vigilance.

THIS WORLD'S A DUMP- I CAN'T SEE ANYTHING IN IT.
GLASS EYES
It's Hard to See The Bright Side OF Life With Glass Eyes— Obey The SAFETY RULES— Wear Goggles— Protect Your Eyes.

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Analysis of the Nation's Fires

ON the two pages that follow will be found illustrations based on accurate tabulations by the Actuarial Bureau of the National Board of Fire Underwriters showing that $99,606,293 of property, destroyed by fire in the United States in 1916, resulted from fires whose causes were "partly preventable";

DISTRIBUTION BY STATES OF FIRE LOSSES CAUSED BY ELECTRICITY IN 1916.

State.	Loss.	State.	Loss.
Illinois	$1.485,579	Virginia ...	145,059
Penn.	1,398,847	Oregon	142,295
New York.	1,324,282	N. H.	136,227
Iowa	1,083,086	Colorado ..	133,899
Mass.	1,078,448	Maryland ..	132,157
California .	1,049,235	Kentucky ..	127,388
Michigan ..	1,020,406	Kansas	115,903
Missouri ..	720,742	Maine	115,165
Texas	712,440	Oklahoma .	103,066
Ohio	708,100	So. Dak....	99,868
New Jersey.	638,660	Idaho	97,003
Wisconsin .	595,304	Mississippi.	88,846
Indiana	419,564	Florida	78,325
Minnesota .	374,180	No. Carolina	61,441
Tennessee .	249,484	Vermont ..	55,427
Georgia ...	217,332	Arizona ...	54,181
Connecticut.	204,779	Montana ..	48,088
Arkansas ..	199,600	Utah	46,100
W. Virginia	197,485	No. Dak....	44,455
Nebraska ..	194,852	Nevada	31,843
Washington	174,815	New Mexico	19,930
Louisiana ..	155,576	District of Columbia.	14,227
Rhode Island	153,090	Wyoming...	10,963
So. Carolina	149,785	Delaware ..	4,268
Alabama ..	147,638		

also that property valued at $60,466,054 was destroyed by fires whose causes were "strictly preventable." There was an additional loss by fire of property valued at $48,632,993 from "unknown fire causes, probably largely preventable."

TOO MUCH INFLAMMABLE CONSTRUCTION

Among the partly preventable fires, exposure (including conflagrations) was responsible for $41,237,168. That was a loss wholly attributable to inflammable construction which permits fires to spread from one building to another. Every dollar of that loss is an argument for fire-resistive construction, which means more fire walls, better roofs, better protection of window openings and skylights, as well as many other things. The exposure loss means that we have in this country too much construction that affords material for flames to feed on by the annihilation of contiguous property.

ELECTRICITY'S BAD SHOWING

Fires originating from electricity stood at the top of the list for amount of property destroyed by any direct cause of fire, namely, $16,559,433. The electrical people who are spending hundreds of thousands of dollars a year for publicity

CAUSES OF FIRES IN 1916 ARRANGED BY PERCENTAGE OF LOSS ATTRIBUTED TO EACH CAUSE

Strictly Preventable:	Per Cent
Defective chimneys and flues	6.1
Stoves, furnaces, boilers and their pipes	5.4
Smoking (cigars, cigarettes, pipes)	4.1
Sparks on roofs	3.5
Matches	3.4
Petroleum and its products	2.4
Open lights	1.0
Gas, natural and artificial	0.9
Hot ashes and coals	0.5
Open fires	0.5
Rubbish and litter	0.4
Ignition of hot grease, oil, tar, wax, etc.	0.3
Steam and hot water pipes	0.2
Fireworks, firecrackers, etc.	0.1
Hot or molten metal	0.1
	28.9
Partly Preventable:	
Exposure (conflagrations)	19.8
Electricity	7.9
Spontaneous combustion	5.2
Incendiarism	3.9
Lightning	3.9
Sparks from machinery (friction)	3.6
Sparks from fires	1.6
Miscellaneous, cause known but not classified	1.3
Explosions	0.6
	47.8
All unknown causes	23.3

campaigns to encourage the citizens of the United States to "Do It Electrically" will probably be surprised at the size of the annual ash heap that is the result of "doing it" electrically. How to make the use of electricity more safe is one of the first jobs demanding the attention of the electrical enthusiasts.

More than $1,000,000 of property loss was attributed to electrical causes in the States of Illinois, Pennsylvania, New York, Iowa, Massachusetts, California and Michigan.

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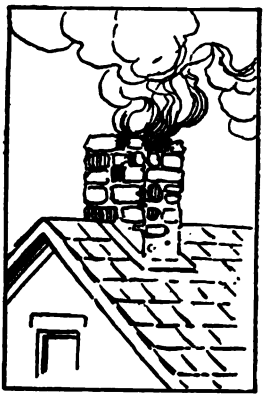
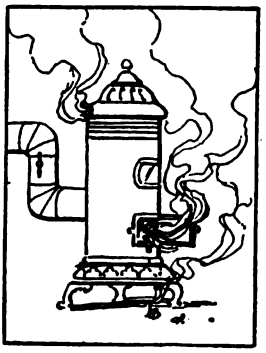
STRICTLY PREVENTABLE FIRE CAUSES

$60,466,054



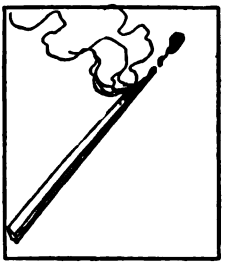
Defective chimneys & flues
$12,724,317



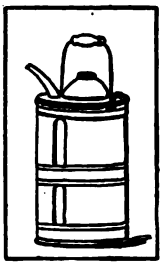
Stoves, furnaces,
boilers and their pipes
$11,204,875

Smoking (cigars, etc.)
$8,588,375

Sparks on roofs
$7,355,047

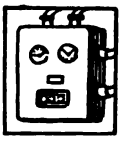


Matches
$7,136,181



Petroleum & products
$5,070,100

Open flame lights
$2,142,958



Gas (natural
and artificial)
$1,815,597

Ashes, etc.
$1,140,194

Open fires
$1,112,953

Rubbish
$777,559

Crease, etc.
$552,130

Steam
pipes,
etc.
$413,176

Fire-
works
etc.
$275,409

Metal
$157,183

National Board of Fire Underwriters.

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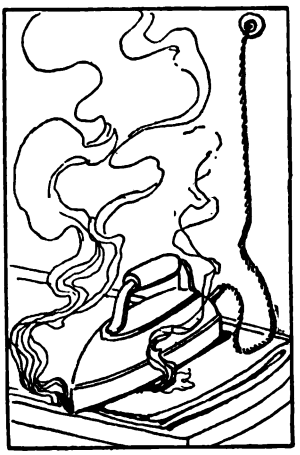
PARTLY PREVENTABLE FIRE CAUSES

$99,606,293

Exposure (including conflagrations)—$41,237,168

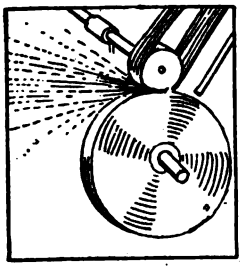


Electricity—$16,559,433

Spontaneous combustion
$10,949,266

Incendiarism—$8,121,816

Lightning—$8,092,622



Sparks from machinery—$7,413,348

Miscellaneous
(causes known,
but unclassified)
$2,646,441

Sparks from
combustion
$3,304,896

Explosions—$1,281,303

National Board of Fire Underwriters.

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EDITORIAL

Occupations for Disabled Soldiers

ANTICIPATING the duty of the State to find occupations for disabled soldiers returning from the war, the Pennsylvania Department of Labor & Industry has sent a questionnaire to Pennsylvania employers. Employers are asked to report types of work or machine operation, and the number of positions open, for certain varieties of disability, among them the loss of fingers on one hand or both hands, the loss of one hand at the wrist or both hands, blindness, deafness, loss of speech, hernia, etc. Similar data should be compiled in every State without delay.

Problems of Labor Turn-Over

THE New York Council of the National Safety Council will discuss "Accidents Due to Labor Turn-over." The more unstable a working force, the greater the accident frequency. Just now the labor turn-over is affected by unsettled war conditions, and how to handle the alien employe is a particular problem. The National Americanization Committee is trying to find a solution by practical men to this problem. A suggestion by the committee is that reports be made by large employers to SAFETY ENGINEERING on how they are handling this matter. We shall be pleased to receive and disseminate information or discussions.

Rochester Furnishes a Lesson

SOMETIMES one observes the narrowness of vision of old "smoke eaters" who fail to appreciate that fire prevention is a part of the general safety movement—that the most effective fire prevention is inspired by "thinking safety." On page 154 is a reference to the wonderful work done by the Rochester Chamber of Commerce, in extensive and intensive campaigns, for fire prevention and accident prevention. A new campaign began on March 1 and will continue until September 1, the most comprehensive effort that any city has undertaken as yet to reduce accidents and fire dangers. All the real workers in these causes will combine their energies to make the present Rochester campaign a great success, and an example for all other cities.

Back Up Uncle Sam

THIS nation and its allies possess the resources with which to overwhelm the common enemies and to secure a victory that will stand, for all time, against the perils to mankind that we are fighting against today. But mere resources will not achieve victory. They must be applied against our enemy in a skillful and prompt manner. One of the resources of the United States is its stupendous wealth. Of all the nations of the world, the United States is the richest. We must invest our gigantic financial resources without stint and invest promptly. Our government is on the eve of floating another great loan for war purposes and is giving in exchange for the use of this money, the safest security that has ever been offered in any country, in any age. It is the duty of every American to answer promptly every call by our country for money and men.

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

New York Safety Council

THE New York local council of the National Safety Council is now holding regular monthly meetings at which visitors are welcome. The object of the regular meetings is to further the safety movement in the New York district, and to increase the usefulness of the local council among employers.

The meeting held on the evening of March 7 was attended by about 70 members and others, and, by the courtesy of the American Museum of Safety, was held in the museum, 14 West Twenty-fourth street. The Museum of Safety is a most appropriate place in which to hold a safety meeting, as it affords an opportunity for studying the comprehensive collection of safety devices to those attending the meetings. Before the meeting came to order an inspection was made of the museum and many of those attending obtained information on the features of various safeguards. A. H. Young, director of the museum, and W. C. Wilson were in attendance and gave information and demonstrations of the application and uses of the safeguards.

The meeting was called to order at 8 p. m. by the chairman, A. S. Regula, vice-president of the New York local council. The topic for the evening was "Safety Problems in Handling Materials and Supplies—by Hand, Trucking, and Piling." Marcus A. Dow, general safety agent of the New York Central Lines, introduced the subject. Mr. Dow presented reports of 21 accidents which have occured on the New York Central Railroad, a copy of which was furnished to each one present at the meeting. After reading through the list of accidents, the subject was thrown open for general discussion, which brought out the experiences of a number of those who have to deal with such problems and up to the time of adjournment, 10 o'clock, the subject was debated with deep interest.

Pennsylvania Department of Labor and Industry.

PROCLAMATION BY UNCLE SAM

The policy of selecting a set topic for each meeting is an excellent one and members were anxious to learn, as soon as possible, what the topic would be for the next meeting, in order that they could look into the subject and come to the meeting provided with information and questions for the discussion. Among the topics suggested for future meetings are: "First Aid," "Instructing the New Man," "Reaching the Man," "Getting

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Members for The National Safety Council." It has since been announced that the subject selected for discussion at the next meeting on April 11 is, "Accidents Due to Labor Turnover."

It was decided to hold the monthly meetings on the same date each month, when possible. The generous spirit of the American Museum of Safety in inviting the New York Local Council to hold its meetings in the museum is greatly appreciated by all those attending the meetings and the able assistance of Mr. Young and his staff will, in a great measure, make these meetings a pronounced success, as no one can attend such a meeting without being amply repaid by what he learns at the museum and the meeting.

The Automatic Sprinkler

EARLY in the seventies of the last century, the Boston Manufacturers' Mutual Fire Insurance Company says in its annual report for 1917, the need of increasing the speed of the machinery in textile plants, in order to increase the product, and also the convenience of having manufacturing buildings of large area, were beginning to be felt. Volatile oils were also coming into use. Without the protection afforded by the automatic sprinkler, these improvements in manufacturing operations would have been nearly, if not quite, impossible, due to the great addition to the fire hazard. That the automatic sprinkler did more than take care of the increased hazard of fire, due to the foregoing changes, is clearly demonstrable.

Killing the "Cooties"

IN view of the crowded housing conditions of workmen at the present time, in many war-time industries, Dr. C. E. Ford of the General Chemical Company suggests that the following might be found of value in combating that all-too-common pest, the body louse.

Heat, dry air or water at temperature of 52 deg. C. will destroy both active lice and nits within a period of 30 minutes. The higher temperatures kill more quickly. Water at the boiling point kills the nits in one-half minute.

In the destruction of lice by heat the all important factor is penetration. Thick or folded garments require a longer time than those hung or spread on tables. A bundle of clothing is only slowly penetrated. Other factors being equal, dry heat is more economical than wet because wet garments require drying after treatment.

Exposure to cold 30 to 38 deg. F. for two days is fatal to active lice, although they may be living at the end of that period. If continued for four days these are killed within the period. Nits may survive this temperature for 10 or 11 days.

In order to keep continuously worn garments free from lice the best method is to impregnate with cresol or crude carbolic acid employed in soap emulsions. Dip the garments in a solution containing from 2½ to 5 per cent according to the climate or season. Hot weather requires less and cold weather more—crude carbolic, soft soap immersion in 5 per cent solution for five minutes.

Colorado vermin killer: Carbon Disulphide, 10 cc. Crude Carbolic, 91 cc. Oil of Tar, 2.5 cc. Kerosene, 435 cc.

Hygiene Is Fundamental

DR. F. E. SCHUBMEHL, of the General Electric Company, of Lynn, Mass., believes that personel hygiene is one of the fundamentals in industry, and has established a dispensary where injured workmen are treated. During such treatments physical defects are often discovered which would otherwise not come to the attention of the injured persons, and by remedying the disability the employes are able to resume work with more efficiency. First aid jars have been distributed throughout the plant, and rest rooms have been established where employes are allowed to rest when not feeling well. These are believed to have gone a great way in reducing accidents and redoubling the efficiency of the workmen.

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13,965 Men Saved from Accidents

THE Illinois Steel Company reports that since the inauguration of the "Safety First" movement in that company thousands of men have been saved from injury and death. Taking as a basis the year 1909, the first full year of safety committee work, and comparing the following years with 1909, the records show that 13,965 men have been saved from injuries causing loss of time or death, during the past eight years. The 13,965 total, year by year:

1910.....	867	1914.....	1,516
1911.....	1,246	1915.....	1,883
1912.....	871	1916.....	2,565
1913.....	1,314	1917.....	3,703

Recklessness Is Unpatriotic

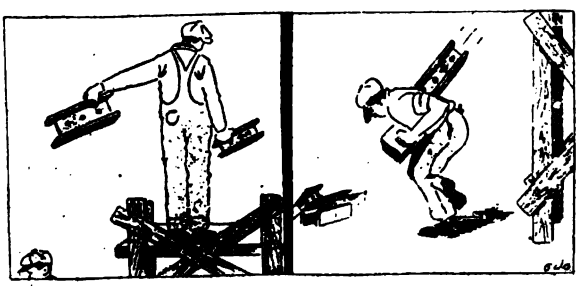
SELF-PROTECTION as a patriotic duty is the keynote of a campaign in the interest of safety, conducted by the Northern Ohio Traction & Light Company, which operates the street railway system of Canton, Ohio. The traction company, in its movement for the elimination of accidents, makes the point that recklessness is unpatriotic at a time when industry has greater need than ever before of whole men, men in good health, with their arms, legs, and bodies in good working order—in proper condition to do the work of the country upon which depends the success of the army abroad.

Mysterious Flare-Back Explosion

COMPLAINT having been received that a restaurant gas stove was acting badly, a foreman opened a lever valve on the stove and applied a match, but it popped back and went out. He removed the burner, unscrewed the gas orifice, and turned it on to see if there was any pressure. That seeming normal, he struck a match to see how long a flame it would throw, but instead of lighting there occurred simultaneously an explosion in the basement 50 feet away. Flame was coming from the meter lead where the meter had broken off and was hanging by one of the leads, a total wreck. It had burst, top, bottom, sides and all parts twisted out of shape. James N. Killgore, of Hackensack, N. J., commenting on the occurence in the *Gas Institute News:* "Air sometimes finds its way into a gas main from an improperly connected air-blast appliance. Air introduced in this way has been known to travel several blocks, either extinguishing all flames or causing them to assume a characteristic Bunsen appearance. It is possible that that condition occurred in this case. The removal of the orifice, and lighting of the issuing stream of air and gas would account for the explosion, as the orifice would act on the same principle as a gauze and conduct the heat away so rapidly that a flash back could not occur. All appliances should be inspected to see that there is no shut off beyond the point of junction of the air and gas."

Accidents in Alaska Mines

A FAIRLY accurate estimate of all the men working about mills, dredges, quarries, lode, and placer mines in Alaska gives a total of 9,118, of whom 4,194 are employed in the lode mines, mills, and quarries and 4,924 about the placer mines and dredges. In the lode mines



OCCASIONALLY a workman will drop or throw material anywhere with no thought of the possible danger or injury to fellow employes. The Inland Steel Company says: "A man who is reasonably careful will assure himself that no one is in the path the material is to take before releasing such treacherous missiles."

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approximately 2,796 are underground and 1,398 are surface employes. In the placers the number of both surface and underground men approximates 50 per cent of the whole. Of the surface employes at the lode mines, about 925 were engaged in mills or metallurgical plants in 1916. Figuring the lode mines as operating the entire year and the placer mines 6 months, the accidents per 1,000 men employed in 1916 were as follows:

	Fatalities.
Lode and placer mines.....	3.180
Lode mines, underground.....	6.795
Lode mines, surface.....	2.146
Placer mines, underground....	4.062
Placer mines, surface.....	1.625
	Serious.
Lode mines, underground.....	41.487
Lode mines, surface (exclusive of metallurgical plants).....	105.708
Metallurgical plants	19.459
	Slight.
Lode mines, underground.....	118.383
Lode mines, surface (exclusive of metallurgical plants).....	285.412
Metallurgical plants	117.838

Extinguishing Burning Gasoline

IF gasoline is ignited water should not be used to extinguish the fire, as it is much more likely to spread the blaze, since burning gasoline floats on water. A large quantity of water thrown on the fire might posibly be effective, the Bureau of Mines remarks, but the best method is to use a reliable chemical fire extinguisher. If none is at hand, the fire should be smothered with sand, or sawdust, or heavy cloths.

Type of Dangerous Construction

THE Electrical Exchange Building, New York, burned in October, 1917, was occupied as an omnibus mercantile, manufacturing and office building. Of fire divisions there were none. Sash partitions offered no resistance to the spread of fire. A brick wall running up through the east end of the building had unprotected openings on all floors. The fire started in the following manner: A metal lined packing case of celluloid collars was being prepared for export, an outside plumber being engaged to solder up the metal lining. He heated his iron over a gasoline furnace, melted the solder over the joint and smoothed it out in the usual way, and had nearly completed his job, there being only a few inches more to solder, when smoke issued from the interior of the case. He tried to get water to extinguish the fire, but the case exploded and fire and smoke drove him from the room. The fire spread throughout the room, out into the court, etc.

Comments by the New York Board of Fire Underwriters: "In this building which was both of excessive height and area for a structure of ordinary joisted construction, there was no protection, either horizontally or vertically to stop the spread of fire. A building of this character of construction and heterogeneous occupancy should have rooms divided one from another with good fire retarding partitions, and all floor openings and court windows suitably protected. The danger of nitro-cellulose products in the form of novelties of various kinds is little appreciated and widely disregarded by many through whose hands this material passes. A caution should appear on each package calling attention to the inflammability of the contents. Non-fireproof buildings of such a height as to make fire fighting in the upper stories difficult or dangerous should be equipped with automatic sprinklers."

Interesting the Men in Safety

IN an endeavor to lessen the number of accidents, the Accident Prevention and Employes' Service at the Chrome Plant of the United States Metals Refining Company has adopted the following measures: The use of a permanent danger sign, a red rectangle with the words "Stop, Look and Listen," in white, where there is a permanent accident hazard; a temporary danger

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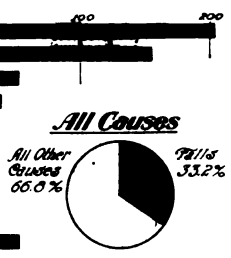
Fatalities and Injuries by Falls

Fatalities in Building and Construction

New York State, 1911–1914

545 Deaths

Nature of Fall	Number
From Girders, Joists, Roofs, etc.	203
From Scaffolds	154
Into Shafts and Other Openings	52
From Ladders	39
From Telephone Poles, etc.	13
Into Trenches, Excavations, etc.	9
By Slipping or Tripping (n.o.s.)	8
Collapse of Structure or Part	7
On Stairs, Steps, etc.	6
Other or Indefinite	54

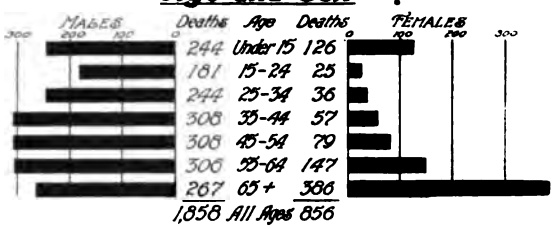


Industrial Mortality Experience, 1914–1916

The Prudential Insurance Company of America

2,714 Deaths

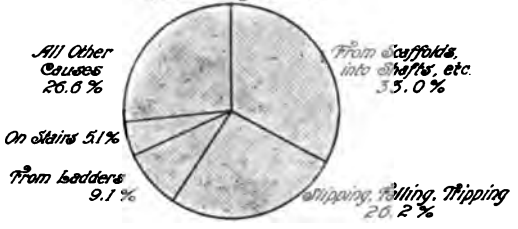
Age and Sex



Injuries Caused by Falls of Workmen

State of California

7,954 Injuries



Occupations

1,442 Deaths of Occupied Males, Ages 15 and Over

	Number	Percent.		Number	Percent.
Laborers	270	18.7	Roofers	25	1.7
Carpenters	115	8.0	Janitors	23	1.6
Painters	92	6.4	Engineers	23	1.6
Teamsters	66	4.6	Plumbers	23	1.6
Clerks	42	2.9	Blacksmiths	22	1.5
Structural Iron Workers	39	2.7	Bartenders	18	1.2
Bricklayers	36	2.5	Longshoremen	17	1.2
Farmers	35	2.4	Water Transportation	17	1.2
Machinists	30	2.1	Porters	17	1.2
Linemen	28	1.9	Miners	16	1.1
Watchmen	28	1.9	Miscellaneous	460	31.9

Courtesy of Prudential Insurance Company.

The Prudential Insurance Company of America, under the direction of Dr. Frederick L. Hoffman, its statistician, has prepared a series of charts of very great value to all persons interested in the prevention of accidents. Through the courtesy of the Prudential, a number of the charts have been published in SAFETY ENGINEERING.

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sign, a red disk with a movable hand attached which points out the direction of the danger; "pay" envelope folders on which are printed safety slogans; bulletin boards illustrating statistics of accidents for the previous month and parts of the bodies injured, also accidents prevented by the use of safety devices, such as the photograph of a man whose eyesight was saved by the use of goggles. A welfare inspector and assistant go through the plant daily and notify the foremen and departments of any unsafe place or practice observed. Suggestion boxes are conveniently placed and the men are invited to drop in suggestions pertaining to safety work. To all men sending in meritorious suggestions, or to those who have done unusual work along safety lines, is awarded a silver medallion bearing the company's name and having an enameled green universal safety emblem in the center. These measures have accomplished a great deal in advancing the cause of accident prevention and arousing interest on the part of the workmen.

Lighting School Buildings

THE Illuminating Engineering Society announces that the revised edition of its Code of Lighting School Buildings is now being placed in type. It will be remembered that the first edition of this code was circulated several months ago for the purpose of obtaining discussions and criticisms. As a result some 100 communications have been received from lighting experts, architects, educators and school superintendents. These have been carefully considered by the Committee on Lighting Legislation in its revision of the technical data and principles of school lighting which are embodied in the code. About 20,000,000 school chldren in the United States daily perform work trying to the eyes. Available statistics show that nearly 10 per cent of the school children, who have been examined, have defective vision. The exactment of rules and regulations and the dissemination of knowledge relating to correct lighting conditions is one of the most important needs of our educational institutions and legislative bodies.

Saving Seconds, Losing Weeks

THE first step is to stop and consider the value and need of safety. When that is done no thinking person will refuse to give hearty support to the safety movement. Why is it that a man or woman will risk losing a limb in order to save seconds? The danger of being five minutes late seems to some to be a greater calamity than the risk of being run down by a 2-ton truck. A person will break every traffic law to catch a train with the result, often, that instead of waiting 15 minutes for another he spends 15 weeks in a hospital. Be safe! Stop and think before you act!

Manager of Railroad Safety

HIRAM W. BELKNAP, chief of the Bureau of Safety of the Interstate Commerce Commission, has been appointed by Railroad Director McAdoo manager of the safety section of the division of transportation, railway administration. Mr. Belknap will continue to act as chief of the Interstate Commerce Commission Bureau.

Necessity of Health Conservation

THE United States cannot win this war with sickness and disease, said Dr. J. N. Hurty, Indiana health commissioner, at the recent safety congress in Indianapolis. There are two enemies that we must fight to the bitter end. One of them is that cruel thing which is trying to stamp itself throughout the world, known as German autocracy and the other is disease. Statistics show that, as a nation, the American people are not as healthy and strong as the Germans. In the United States 34 persons in every 100,000 die annually of typhoid fever. In Germany just 3 of every 100,000 die of that dis-

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ease. One of every 7 children born in the United States dies before it reaches the age of one year. In Germany the figures are one in every 10. The Germans have 3 points on us in a most vital spot, that of the coming man power. Only 50 per cent of Americans called to the army are finally accepted as physically fit. Sixty-seven per cent of the Germans pass the tests and are admitted to the army.

Interior Fire Alarms

THE following amendment to Interior Fire Alarm Rules was adopted by the New York City Board of Standards and Appeals, February 7, effective March 6, 1918. "Rule 7. Five-story Factories. In factory buildings, as defined in the labor law, not exceeding 5 stories in height nor 2,500 square feet in area in any story above the first, occupied by not more than one tenant, in which not more than 100 persons are employed at any time above the first story, or occupied as a tenant factory in which not more than 50 persons are employed at any time above the first story, the fire commissioner shall accept either mechanical, non-coded closed circuit or coded closed circuit fire alarm signal systems."

Two Pairs of Goggles

TWO pairs of goggles sent to the American Museum of Safety by the Raritan Copper Company have stories behind them which the copper company tells: "One pair was worn by Jack Rhodes while chipping a cast iron pipe in Power House No. 1. A piece of iron hit the lens over the right eye, but only the glass was damaged. The other pair is of special interest since both lenses were struck by spatters of molten copper. They were worn by Tony Golabeski, a fisher at No. 10 furnace. One might say that he had both eyes saved by this pair of goggles if it were not for the fact that the right lens was hit on August 1 and the left lens on the following day. If he had not been protected by goggles, his right eye would have been painfully burned, and it is a sure bet that he would not have been working the next day. The second splash was a wicked one, and Tony was wise in having the goggles where they belonged instead of in his pocket, even though he should have asked his foreman for a new pair."

Nails and Falls

ACCORDING to David S. Beyer, safety engineer of the Mutual Liability Insurance Company, workmen in the State of Massachusetts lose $1,000,000 a year as a result of accidents, 75 per cent of which might be prevented if everyone believed in "Safety First." From 3,000 to 4,000 people are injured from stepping on nails, and twice that number as a result of falls due to tools left in the way of employes. All such accidents could be prevented by cooperation.

Hampden County Council

THE Hampden County, (Mass.,) Safety Council, although organized only a few months ago, has now a membership of about 40, including public service corporations, United States armory and some of the largest industries in that locality. Regular round-table meetings, with specific subjects, are held each month. The February meeting covered "Dangerous Practices," and in March the subject "How to Build Safeguards" will be taken up. Frank Howard of the Lamb Knitting Company, Chicopee, is president; and L. D. von Woedtke, director of safety; Fred T. Ley & Company, Inc., Springfield, is secretary and treasurer.

First Aid Lectures

THE Standard Pneumatic Action Company of New York has enrolled a committee of its employes which will attend a first aid lecture course under the auspices of the Young Men's Christian Association in New York City, in connection with the

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"Safety First" movement of that firm. The first hour of each meeting will be devoted to anecdotes and theory, illustrated with stereopticon pictures; the second to practical demonstrations. At the close of the course members of the class may take an examination leading to a diploma from the Red Cross Society.

To Check Street Accidents

THE New York State Conference of Mayors has issued these suggestions for the elimination of street accidents: A more rigid enforcement of the State highway traffic act, and the speed provisions of the State automobile law. A better knowledge of traffic and speed laws and compliance with their provisions by drivers. The regulation of pedestrians crossing or in any way using the highways. Changes in the automobile headlight law. A law requiring the registration of drivers and an adequate examination and test of all new operators of automobiles and motorcycles. Greater co-operation between police and parents in regulating the play of children in streets.

Adequate Ventilation Defined

IN interpreting the meaning of the term "adequate ventilation," as used in the sections of the New York sanitary code, relating to the occupancy of premises by persons, action in the enforcement of the code will hereafter be governed by the standards of ventilation adopted by resolution of the Board of Health of the City of New York on December 11, 1917. These are as follows:

1. Temperature—The temperature in rooms during periods of occupancy should register preferably from 60 to 70 degrees Fahrenheit at all times, except when the outside temperature exceeds 60 degrees Fahrenheit. This does not apply to rooms used for special purposes such as industrial places where high or low temperatures are essential and unavoidable.

2. Humidity—The relative humidity in occupied rooms should not exceed 70 per cent, except when the outside bulb temperature exceeds 59 degrees. In no case, however, should the wet bulb temperature exceed 78 degrees.

3. Carbon Dioxide—The carbon dioxide in occupied rooms in all classes of buildings should not at any time exceed 10 parts in 10,000 volumes of air in any part of the occupied spaces of the rooms.

4. Dust—The dust particles in the air of occupied rooms in all classes of buildings should not exceed 1,000,000 per cubic foot, or .004 (4 milligrams per 100 cubic feet).

5. Bacteria—The bacteria content should not exceed 100 per cubic foot.

6. Odors—The air of occupied rooms of all classes of buildings should be free from objectionable odors, which may be detected by persons entering the room from the outside air, whether the odors are of human origin or otherwise.

Safety in Handling Materials

THE Inland Steel Company has issued to its employes the following suggestions for safety in handling of materials, to which cause it claims 26 per cent of its accidents are due:

Keep your hands and feet out of danger.
Keep your eyes on your work.
When carrying material see that you have a secure hold.
Stand to one side when pulling bars out of bundle so that if it should slip it will not strike you.
Use wrench to handle material.
Look before dropping material.
Use hand hooks to straighten scrap in pans.

Ashes Extinguished Fire

ASHES were more valuable than water in extinguishing a fire that occurred on property of the Cream City Roofing Company, at Milwaukee, Wis., where hundreds of barrels of pitch, tar, and paint were stored. As the fire spread through these barrels the streams of water directed upon them made little headway in checking the flames. The fire chief then ordered the burning

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liquid to be smothered with ashes and in a short time the occupants of houses in the neighborhood found their ash piles confiscated by firemen. The effectiveness of the order was soon seen, as dense smoke began to clear when ashes were thrown on the burning tar.

Soap Rendering Tank

RECENTLY, a California safety engineer states, a man was killed and his two rescuers were put into the hospital in a serious condition from poisonous gases due to the accumulation of decomposed organic products in a soap rendering tank. The men were not using good operating practices to go down into a large vat without first taking ample precautions to thoroughly aerate and remove all possible chance of gassing.

Making Foundries Safe

A. F. CORBIN, chairman of the Committee on Safety and Sanitation reported at the 21st annual convention of the National Foundry Association, that over $50,000 worth of safety supplies had been sold by the association during the past year, and that every effort was being made by the committee to impress upon members and non-members of the association the necessity of making the foundries safe and sanitary.

New York's "Board of Review."

CHIEF DOYLE of the Bureau of Fire Prevention, New York City, has made a ruling, approved by Fire Commissioner Drennan, that will be welcomed by realty interests, architects, etc. The ruling creates what is called "The Board of Review," within the Bureau of Fire Prevention, the membership of the board being constituted as follows:

Chief of the Bureau of Fire Prevention, chairman.

Deputy Chief of Fire Department detailed to the Bureau of Fire Prevention.

Deputy Chief, Bureau of Fire Prevention, Manhattan.

Supervising Inspector.

Secretary to Fire Commissioner.

As the practice stands now, owners, appellants and other parties affected by the rulings of the Bureau of Fire Prevention have no redress except by appeals to the Board of Standards and Appeals and the Board of Appeals. The object of the new board is to afford prompt relief in all cases where conditions justify and the mandatory provisions of the law do not prohibit. The Board of Review is to meet Tuesdays, Wednesdays and Thursdays of each week at 2.30 p. m.

Ontario Safety Literature

ABOUT a quarter of a million separate pieces of literature distributed in the province represent one of the tangible activities of the Ontario Safety League in 1917, as summed up in the fourth annual report. A large proportion were permanent notices, each of which appeals to thousands of people. Much of the work was done through school children.

Driving Mail Wagons Recklessly

MAYOR JOHN F. HYLAN, of New York City, in a letter to the Police Commissioner, has called attention to the "disgraceful and dangerous" manner in which motor trucks and United States mail wagons are driven through the streets. "The operators of the trucks seem to have no fear of any consequences that might result from careless and fast driving; and the mail wagons are not operated by the Federal Government but are controlled by private individuals, who have no more right to exceed the speed limit or to drive recklessly than has the ordinary individual. The death toll which has resulted from the reckless operation of heavy motor vehicles is not only surprisingly large but absolutely shocking. It may be necessary to recommend to the Board of Aldermen the placing of governors regulating the speed on all motor vehicles."

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Ellsworth Collieries Dairy

IN conjunction with the sociological work attempted by the Ellsworth Collieries Company, a dairy is maintained, where care is taken to produce the best milk possible, under regulations of the State Department of Agriculture. The milk is sufficiently high in quality to be certified and is given to employes at the same price at which milk from other dairies is sold. Instruction in the care of health is given through medical examinations, oral hygiene, frequent tests of drinking water, distribution of literature, and personal visitation.

Don't Pass Street Cars at Left

A MAGISTRATE of the New York City Traffic Court warns drivers of motor vehicles not to pass street cars on the left side, in a safety bulletin, reading: When an operator or driver passes a street car on the left he goes to the wrong side of the street where others are not expecting him to be. Many injuries occur because of this, and the time saved may not be considered in comparison with the safeguarding of pedestrians and drivers of other vehicles.

"Empty" Acid Carboys

A SHIPMENT of acid carboys returned as "empty" by a fire department was being removed by a transfer company's teamster at destination. While placing the load on his wagon some acid left in one of the carboys splashed on his neck and face causing slight burns, the result of failure to provide the carboys with stoppers and neck protectors well secured.

A National Plague

FOR several years nearly 5,000 people, annually, have lost their lives, directly or indirectly, as a result of motor car accidents, the majority of which were caused by carelessness. Whether the fault was with the man in the car or the man in the street has often been difficult to determine. Francis M. Hugo, Secretary of State of New York, says that a careful driver is the best safety device. Human ingenuity can devise mechanical contrivances that will lessen automobile accidents, but it is the careful driver who holds the key to the situation. A large percentage of accidents is due to the careless drivers. They constitute a national plague. For such men, mechanical devices, words of caution, and arrest become necessities. Something must be done to decrease the number of automobile accidents.

Appointed Safety Managers

JAMES HARMON has been appointed safety manager for the Kentucky Utilities Company, the Interstate Public Service Company, and other adjacent Middle West Utilities Company properties, with offices in the Paul Jones Building at Louisville, Ky. As safety agent of the Interstate Public Service Company and more recently as representative of the Bureau of Safety, Mr. Harmon's work has been very successful.

George W. Strack, Jr., who has been a member of the Bureau of Safety's force for four years, has been appointed safety agent for the Central Illinois Public Service Company.

Always Keep Safe Distances

A RAILROAD employes' magazine relates that a section motor car, carrying 11 men, recently ran into a passenger train which it was following, injuring all men on the car, five of them perhaps fatally. The supposition is that the motor car was following the passenger train too closely and that the passenger train suddenly stopped and the motor car ran into its rear.

This is a warning to track forces and others operating motor cars. The danger of operating motor cars at fast speed is great, particularly around curves, through stations and over switches.

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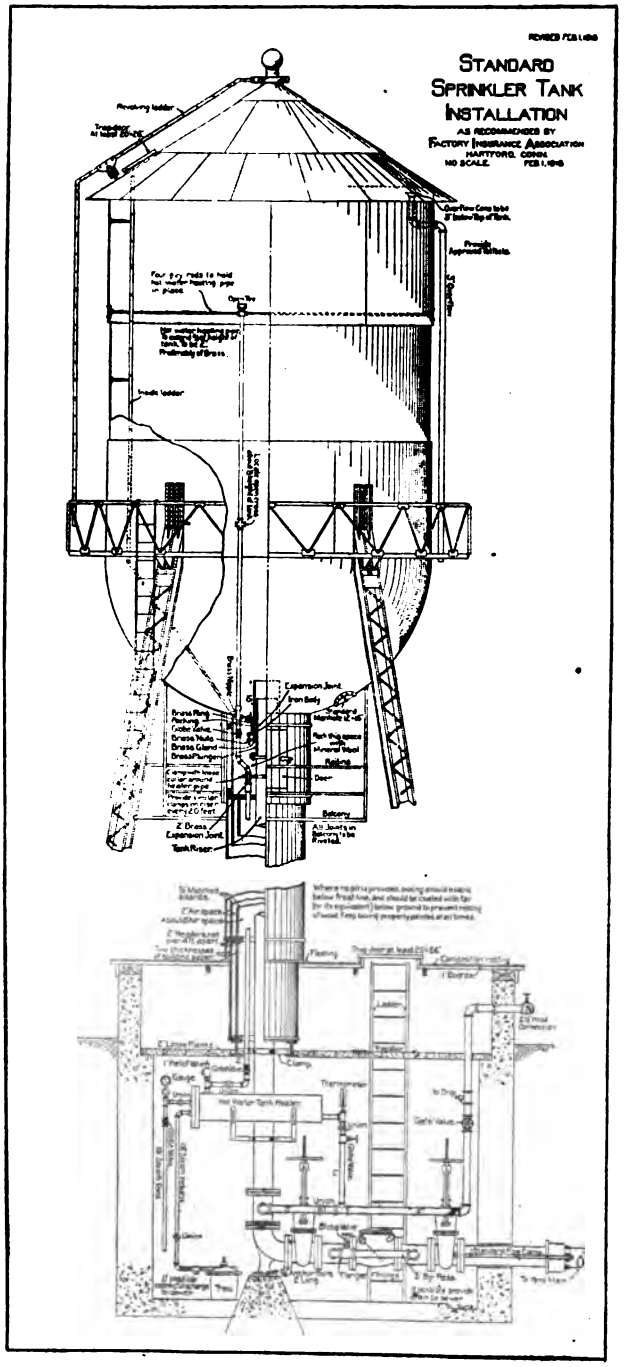
Standard Sprinkler Tank

The Factory Insurance Association's standard sprinkler tank installation, revised February 1, 1918, shows gravity tank on steel trestle, valve pit, hot water tank heater and the details of the connections required. As there have been several changes from the previous standard, engineers and manufacturers who are directly interested in installations of this kind are especially requested to take note of the details of the new standard, as all future installations coming within the jurisdiction of the Factory Insurance Association should conform to this layout.



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National Fire Protection Association

Twenty-second Annual Meeting, Chicago, May 7, 8 and 9

IT is proposed to hold the twenty-second annual meeting of the National Fire Protection Association in Chicago on Tuesday, Wednesday and Thursday, May 7, 8 and 9, 1918. By courtesy of the Chicago Board of Underwriters, H. H. Glidden, manager, the sessions will probably take place in the auditorium of the Insurance Exchange, 175 West Jackson Boulevard.

LAST CALL FOR COMMITTEE REPORTS

Chairmen of committees are reminded that no reports except those merely progressive or informative can be presented to the annual meeting unless the same are in the executive office for advance printing not later than April 1.

INDIVIDUAL LIABILITY CAMPAIGN

It is hoped, Secretary Wentworth says, that during the next few weeks some of the campaigns which have been undertaken in various cities this winter for the adoption of ordinances fixing liability for the cost of extinguishing fires due to carelessness or neglect will be brought to a victorious conclusion. It has been suggested that members might greatly assist this propaganda by securing the publication of articles on the subject in their local newspapers.

MOTION PICTURE STANDARDS AND DEFINITIONS

In view of the increasing importance of motion pictures in relation to fire protection, many members will be interested in the booklet issued by the Society of Motion Picture Engineers, containing the standards and definitions it has adopted and is promulgating to encourage uniformity and standard practice throughout the motion picture industry. The president of the society, C. Francis Jenkins, will be glad to send a copy to any member writing him at 712 Eleventh street, N. W., Washington, D. C.

SAFETY FOR THE HOUSEHOLD

Circular No. 75 of the Bureau of Standards, S. W. Stratton, director, is an illustrated publication of 127 pages giving comprehensive instructions for preventing and combating fire and accident in the home. A good index is provided and the various hazards are thoroughly and interestingly explained. Copies may be purchased for 15 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

INDUSTRIAL BUILDING, INDIANAPOLIS, FIRE

An instructive illustrated report on this $1,500,000 sprinkler fire, which occurred on January 13, 1918, has been published by the Indiana Inspection Bureau. Any member desirous of obtaining one before the supply is exhausted should address E. M. Sellers, Merchants Bank Building, Indianapolis, Indiana, without delay.

KEROSENE BURNERS AS A SUBSTITUTE FOR ORDINARY FUEL

Among the misfortunes resulting from the shortage of fuel must be reckoned the temptation, under which many householders and others must have found themselves, to install kerosene burners as a substitute for coal or other fuel in stoves and furnaces. It need hardly be said that the general use of such devices would be attended with serious hazard. In cases where their installation is permitted temporarily as an emergency measure, it is of the utmost importance that all requirements of the inspection department having jurisdiction should be strictly observed. The New York Board of Fire Underwriters has found it necessary to give special attention to specifications for emergency installations of this character.

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Sanitary Standards for Industrial Plants

THE Sub-committee of the Committee of Sanitation and the Committee of Labor of the Council of National Defense, has formulated the following standards of sanitation which have been adopted by the Committee on Shop and Industrial Sanitation. These standards are operative in all factories where Government work is being done. The standards are applicable only to factories and shops where the workers do not handle industrial poisons, it being understood that special provisions for such processes and workers are to be made under other standards.

Committee:

Dr. George M. Price, Chairman, Director, Joint Board of Sanitary Control, New York.
Dr. Thomas Darlington, of the American Iron Institute.
Dr. William E. Duncan, Deputy Commissioner, Department of Labor of Connecticut.
Mr. John Roach, Department of Labor, New Jersey.
Dr. John Vogt, Industrial Commission, New York State.
Dr. Francis D. Patterson, Department of Labor and Industry, Pennsylvania.
Dr. Louis Harris, Health Department, New York City.
Dr. Walter Hudson, duPont deNemours Company, Wilmington, Del.
Miss Pauline Goldmark, National Consumer's League.
Mr. William C. Groeniger, Ohio State Board of Health.

I. DRINKING WATER

1. *General Provision*: There shall be provided in every factory for the use of employes a sufficient supply of wholesome cool drinking water.

2. *Location*: Drinking water facilities should be provided on every floor of factory buildings in accessible places.

3. *Fountains:* Wherever practicable, drinking water should be provided through bubble fountains or inverted spigots, so constructed that a person may drink from the stream or jet of water without touching his lips or mouth to the metal part of the fountain.

4. *Receptacles*: Whenever drinking water is placed in receptacles, these shall be constructed of metal or glazed earthenware and provided with cocks and spouts and properly covered so as to prevent contamination; also cleaned at frequent intervals.

5. *Drinking Cups*: No common drinking cups or glasses should be permitted. Paper cups or individual glasses should be used.

II. WASHING FACILITIES

1. *General Provision*: In every factory there shall be provided and maintained for the use of the employes suitable and convenient washing facilities, separate for each sex, provided with running water and consisting of single or trough sinks without plugs, or stationary basins, of a material easily cleansable and maintained in good condition.

2. *Location*: Washing facilities shall be conveniently located in accessible places.

3. *Number*: There shall be provided at least one sink or stationary basin, with hot and cold water, for every ten employes, or at least two feet of trough sinks for every ten employes, or a perforated pipe with a continuous flow.

4. *Floors*: The floors under the basins and sinks shall be kept in good repair and in good condition.

5. *Towels*: The use of roller towels or any towel in common is prohibited. Paper or individual towels should be used.

6. *Receptacles for Soiled Towels*: Whenever paper towels are provided, receptacles for such towels shall be provided.

III. TOILET FACILITIES

1. *General Provision*: Toilet facilities shall be provided in accordance with the following standards:

2. *Apartments*: (a) Location: All toilets shall be located conveniently to and easily accessible from, all places where persons are employed.

(b) Separation: Toilet rooms for each sex shall be maintained separate and apart from each other and from all workrooms and passageways. Such rooms shall be marked so as to designate plainly and distinctly for which sex they are intended.

(c) Screening: If the water-closet is not located within a separate screened compartment in the toilet room, the entrance to all toilet rooms shall be provided with a screen to ensure privacy. This screen shall be at least 6 feet in height, and shall extend to within at least 4 feet of the floor, and, if the space permits, shall be not less than 2 feet wider than the door leading into such toilet room.

(d) Distance: All toilet rooms not having sewer connection and maintained outside of buildings, where people are employed, shall be at least 25 feet from such buildings, and in all factories where the workers are exposed to excessive heat, humidity, or fatigue from physical exertion, there shall be a covered

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passageway connecting said building with toilet or toilets.

(e) Construction: The outside partitions of all toilet rooms shall be of solid construction, and made opaque or translucent, but not transparent, and, shall extend from floor to ceiling, or such rooms shall be independently ceiled over. All partitions separating toilet rooms provided for the different sexes, shall be at least 2 inches in thickness and constructed of such materials as are not transparent or translucent, and they shall be sound-proof and no openings in such partitions shall be permitted. Where more than one water-closet is provided in one toilet room, each water-closet shall be in a separate compartment provided with a door. The partitions and the door shall be composed of material that is opaque or translucent, but not transparent. The tops of the doors and of the partitions shall be carried either to the ceiling, or to a height of 7 feet from the floor; the bottom of the doors and the partitions shall not be more than 4 inches from the floor.

(f) Floors: The floors of all toilet rooms shall be tight, smooth and constructed of a substance that shall be impervious to moisture.

(g) Walls. The walls of all toilet rooms shall be tight and of a substance that can be readily cleaned and kept clean.

(h) Ceilings: The ceilings of all toilet rooms shall be tight and of a substance that can be readily cleaned and kept clean.

(i) Light: All toilet rooms and water-closet compartments shall be adequately illuminated by natural or artificial light.

(j) Ventilation: All toilet rooms not lighted by windows that open easily shall be adequately ventilated to the outside air by artificial means. Every water-closet compartment entirely separated from the remainder of the toilet room by partitions extending from the floor to the ceiling and not provided with a window opening easily shall be adequately ventilated to the outside air by artificial means.

Every toilet room or every water-closet or urinal compartment shall have a window opening directly to the outdoor air. No such window shall be less than 1 foot wide nor have an area of less than 6 square feet, measured between stop heads, for one water-closet or urinal. For every additional such fixture, the area of such window shall be increased at least one square foot. A skylight shall be deemed the equivalent of a window, provided that it has fixed or movable louvres with openings of the net openable area prescribed for such window.

Every such window shall open upon a street or upon a yard or open space, uncovered at the top, which in its least horizontal dimension shall be at least one-tenth the height of the highest abutting wall but in no case less than 6 feet.

(k) Heating: All toilet rooms and water-closet compartments shall be adequately heated at all times.

(l) Cleanliness: The occupier shall be responsible for the maintenance of all toilet rooms or water-closet compartments in a clean and sanitary condition.

3. *Fixtures*: (a) Kind: The use of any form of trough water-closet or latrine, or school sink is prohibited; individual closets shall be provided. The bowls of all water-closets shall be of smooth, impervious material. Pan, plunger, wash-out, faucet and long hopper closets are not permissible. The seat shall be finished with a smooth, impervious waterproof substance.

(b) Connections: The disposal of all contents of toilets and urinals shall be in accordance with the laws, rules and regulations of the State and municipal health authorities of the locality in which they exist.

Privies shall not be permitted in cases outside of the sewer zone, and where cesspool or septic tank cannot be used, privies not connected with the sewarage system shall be built in accordance with the standards recommended by the United States Public Health Service. Provision shall be made for the adequate flushing of every water-closet.

(c) Number and Ratio: Water-closets shall be provided in accordance with the following table:

Number of Persons	Number of Closets
1 to 20	1
21 to 40	2
41 to 60	3
61 to 80	4
81 to 100	5
101 to 150	6

For each additional 30 persons, at least one additional water-closet shall be provided.

4. *Urinals*: (a) Kind: Urinals provided shall be either individual urinals or slab urinals. At least 2 feet of slab urinals shall be considered the equivalent of one individual urinal.

(b) Construction: Urinals shall be composed of smooth material, impervious to moisture.

(c) Connection: All urinals shall be connected by waste pipes to sewer or cesspools, which sewers or cesspools shall be constructed in accordance with the laws, rules, and regulations of the State and municipal health authorities of the locality in which they exist.

Unless water runs continuously over the walls of a urinal each urinal shall be provided with an adequate water flush. When individual tanks are used, the flushing shall be accomplished by pedal action.

(d) Number and Ratio: Where more than 10 males are employed at any one time, urinals shall be supplied according to the following table:

Number of Men	Number of Urinals	or	Feet Slab Urinals
10 to 30	1		2
31 to 60	2		4

For each additional 50 men employed at least one additional urinal or 2 additional feet of slab urinal shall be supplied.

The above standards shall apply in all cases except where Federal, State, or municipal laws.

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rules or regulations of more restrictive character are applicable; in such instances, the more restrictive laws, rules, or regulations shall apply.

Dressing Facilities: Each worker shall be provided with a clean place in which to change from street clothes to working clothing. A pipe rail equipped with clothes hangers, and fastened high enough from the floor so as to prevent the clothes from dragging, will be accepted by the Department, excepting when the workers are:

(a) Engaged in handling poisonous materials.

(b) Exposed to injurious dust or fumes.

(c) Excessive heat, humidity, or fatigue from physical exertion.

General Cleanliness—Receptacles for rubbish, etc. In all shops separate covered receptacles, for receiving paper, clippings, or other refuse of that nature, shall be provided. Such receptacles shall be emptied at least once a day, oftener if necessary. The occupier shall be responsible for the general cleanliness of the shop.

Safeguards at Blast Furnace Plants

"OCCUPATIONAL Hazards at Blast-Furnace Plants and Accident Prevention" is the title of an exhaustive report by Frederick H. Willcox, issued by the Bureau of Mines. Mr. Willcox gives a long list of the safeguards employed at various plants:

CAR-DUMPER SAFEGUARDS

Lights at approach and discharge.
Fenders on truck wheels.
Inclosed cradle counterweights.
Steps to operator and motor house.
Electric trolley or "third rail" elevated 8 to 12 feet above yard level or inclosed in underground conductors.
Overtravel device for cradle.
Permanent railed platform about hopper of stationary car dumper.
Going to notify operator when men are off from cradle.

SAFEGUARDS FOR LARRY OR TRANSFER CAR

Fenders of the trolley-car type.
Air whistle or hand horn.
Headlights.
Air brakes.

ORE-BRIDGE SAFEGUARDS

Truck-wheel fenders and guards.
Inclosed gears on drive and transmission.
Caged ladders up gantry legs.
Fireproof operator's cage.
Steps to platform of operator's cage.
Floor of cage extended to form landing plattorm and railing around platform.
Automatic warning bells.
Bumpers at ends of rail girders.
Rail clamps beneath trucks.
Footwalk with double railing entire length of bridge and across ends.
Main-line switch outside of cage and at each end of bridge at the trucks.
Trolley or third rail elevated or placed outside trestle work.

TRESTLE SAFEGUARDS

Railed walks with outside edge 6 feet from rail and inside edge directly beneath car frame.
Crossovers from each bin to enable men to get to opposite side without jumping.
Gratings, cable, and pipe over bins between track girders. Also similar cover between walk and track girders.
Use of safety belt and line in entering bins and in unloading cars.
Use of pinch bars, each with disk on handle and tool-steel insert in heel.
Use of safety wrenches of various types.
Use of magnet to unload heavy scrap.

STOCK-HOUSE SAFEGUARDS

Platform for barring ore from chutes.
Chutes provided with auxiliary heavy sluice gates to cut off flow of material.
Arrangement of levers and cables for operating chutes so that operator is out of reach of falling or flying stock.
Bin door or chute mechanism guarded and provided with oiling platform.
Quick-stopping device for driving shafts.
Fenders, air brakes, and gongs or air whistles for scale cars.
Overhead trolley for scale cars.
Ample clearance for men on side of scale car or recesses in walls at intervals.
Railing between scale-car track and entrance to stock house.
Passageway from beneath chutes and outside of tracks.
Warning sign placed at empty bins about to be filled.
Knuckle guards on barrow handles.
Arrestor rail about skip pit to prevent hand barrows from falling into pit.
Steps or ladder to bottom of skip pit.
Clearance about skip car at sides and bottom of pit.

HOIST-HOUSE AND SKIP-INCLINE SAFEGUARDS

Locked doors at entrance.
Inclosing entire drum with removable wire-netting guards.
Railings about drum and motor or engine.
Hoisting cable run through chute to roof opening.
Connecting rods and cranks guarded.
Gears and screws on overtravel devices guarded.
Overspeed and slack-cable devices on hoist motors.
Locks for throttles and switches of hoist engine and motors.
Standard guarded switch boards.
Skip track equipped with shield at point 7

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to 10 feet from stock house and yard level to prevent men from putting hands on rail.
Skip track equipped with shield on underside from top of furnace.
Overtravel device at top of skip tracks.
Safety clamp on cages thrown on by spring.
Sides of cage inclosed with sheet iron or small-mesh woven wire.
Cover over top of cage.
Gates at both top and bottom landings automatically operated by travel of cage.
Providing top platform with safety catches that secure cage at top.
Platform at sheave wheels.

SAFEGUARDS IN CONNECTION WITH INDICATING DEVICES

Signal to cast house or blower's office to inform of furnace hanging.
Speaking tube or telephone to furnace top.
Locks for bell and skip operating levers.

SAFEGUARDS FOR FURNACE TOP

Shanty for top fillers, located behind or at side of hoist, with window opening away from furnace.
Rail about hopper to catch barrows.
Railed platform at top of receiving hopper.
Guards about distributor mechanism.
Permanent steps or caged ladders to sheave-wheel and other platforms.
More than one means of approach to furnace top.
Means of plugging rodding hole when working on top.
Stretcher to lower men from top where descent is difficult.
Telephone, speaking tube, or electric-gong signal from top to stock house or cast house.
Steam connection to gas seal over big bell.
Platforms connecting explosion doors, bleeder valves, and outriggers.
Bolting or chaining a number of explosion doors to limit their opening, or placing shields in front of doors.
Use of bleeder valves or explosion valves that allow only fine ore and gas to escape.
Elimination of "bracket and plate" top construction.
Elimination of rodding of furnace from top.
House or shelter on top to protect men from slips.

FURNACE-STACK SAFEGUARDS

Railed platform about shell to facilitate use of sprays for hot spots.
Shells double and triple riveted and with butt straps and of thickness up to 1¼ inches.
Corrugated-iron or steel wearing plates in place of, or in front of, brickwork at stock line, eliminating repairs during blast.
Permanent railed platforms about stack to allow access to cooling plates.
Steps or caged ladders to stack platforms equipped with a warning device to be operated when steps or ladders are in use.
Railed platforms on bustle pipes.
Bosh bands 1¼ inches thick.
Bosh plates anchored in boxes.
Tuyere breast armored with 1-inch steel plate or cast-steel jacket.
Strong bridle posts, rods, and springs.
Auxiliary bridle rods.
Elimination of pivoted counterweighted eyesights.
Elimination of spray cooling of hearth jacket.
Elimination of ditch about hearth jacket.
Hearth jackets to extend 4½ to 5 feet below iron notch.
Strong hearth jacket up to 6 inches thick, and strong bands up to 2 inches thick.
Adequate tying in of hearth-bottom brickwork.
Two cinder notches.
Water-deflecting shields over skimmer trough and cinder-notch runner hung from bustle pipe.

CAST-HOUSE SAFEGUARDS

Railed sides and railed or grated casting holes.
Runways at exits of cast houses.
Steel plate 3/16 to ¼ inch thick on roofs with steep slope.
Ventilator about stack.
Short runners and railings along runners.
Bridges over runners.
Shutters operated from a safe distance by cables, steam cylinders, or counter-weights.
Shields at hand-operated shutters.
Footpieces on shutters.
Shields over or below skimmer to prevent coke and slag from blowing down into cast house.
Shields at punch out and monkey skimmer.
Raising of punch-out gate and splasher from safe distance by cables.
Long pipe for iron-chilling trough.
Electric drills for opening tapping holes.
Shields for use in drilling or driving bars at tapping holes.
Automatic mud guns.
Funnels on clay cylinder and shield on nose of hand-operated guns.
Steam exhaust turned up and away from rear of gun.
Automatic cinder-notch bots.
Adjustable shields for hand botting.
Checkered floor plates.
Auxiliary signal to blowing room.
Protection plate in front of snort-valve lever.
Relay system by which signal to blowing room sounds "buzzer" at skip and bell operator's station.
System of red and white electric-light signals by which the hanging and slipping of the furnace can be signaled from stock house to cast house, or reverse.
Signal to boiler house from cast house.
Signal to gas washer from cast house.
Warning whistle, lights, or signs for slips, operated from cast house.
Catch basin for iron in runners leading to ladles and granulating pit.
Oxygen burner for hard or ironed tapping holes.
Means of holding "welshman" when bar

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is backed from tapping pole, so that no one is exposed to burns from flying iron.

Means of holding bar being driven into tapping hole to keep men out of range of misdirected stroke of sledge.

Water-supply pipe for cinder-notch coolers extending one-third or one-half around furnace before rising to circle water-supply pipe.

Elimination of cooling plates or boxes about sides of tapping hole.

Steep slope of skimmer iron trough.

Goggles, masks, leggings, box-toe shoes, and safety or gauntlet-gloves provided at cost.

SAFEGUARDS IN CONNECTION WITH IRON DISPOSAL

Heavy bottoms in iron ladles and ladles equipped with devices for keeping them upright on frames or cars. Automatic couplers and safety chains. Steel underframes between trucks.

Each dumping crane or winch equipped with cable attached to hook fitted with hand hold, instead of chain and common hook.

Pourer at pig machine protected from splashes.

Trough men furnished with masks or goggles, and shields placed at end of spout over mould, or shields behind which men may work.

Walks over strands and runners and between strands from front to back.

Automatic knockers at discharge end of mold.

Shields of wire mesh at end of chain, also along car track opposite chutes.

Railings along columns of pig machine, except at passageway, which should be covered with plate shield.

Steam valves for lime sprags placed out of path of molds.

Lime run into lime vats by spouts from mixing tanks.

Standard guards for engine or motor, guns, chains, and transmission equipment.

Quenching pits with heavy brick walls or steel-plate shields, behind which men work.

Iron chills or depressions in yard into which ladle cleanings are dumped, and shields behind which men can work.

Ladle pits in floor of ladle house, provided with coping walls.

Part of ladle house in which skulls or scrap is broken to be inclosed for protection of man dropping ball.

GUARDS FOR GAS-MAIN SYSTEM

Elimination of counterweight explosion doors on downcomer, dust catcher, and mains.

Inclosure for base of dust catcher.

Operating device for bell lever on dust catcher that permits dumping by man standing a safe distance away.

Clamp to hold dust-catcher bell lever tight in shut position.

Provision of large (4-inch) sprinklers to wet dust thoroughly as it is dumped into car.

Steam inlet to dust catchers.

Water seals in conjunction with valve mechanism at gas main offtake from dust catcher to prevent explosions or asphyxia.

Bleeder device at dead end of gas main.

Downlegs from gas main brought low to prevent flying of dust.

Clamping of bells on downlegs, and cables to open bells from safe distance.

Manholes of adequate size.

Close spacing of manholes.

Railings and platforms along tops of gas mains, with permanent ladder approaches.

Water-seal valves at points where parts of the system are to be isolated, with clamps for the bells.

Frequent downlegs, V pockets, or washing facilities, requiring less frequent work inside mains.

Pressure gage, reading in inches of water, to indicate pressure of gas in mains.

SAFEGUARDS AT GAS WASHERS

Steps to top and to cleaning doors, side sprays, or water inlets.

Water-seal and mechanical valves on the inlet side, and water-seal valves on the discharge side.

Adequate ventilation by fans or exhausters when men are cleaning inside.

Rotary washer outside of building.

Fans for ventilating scrubber or gas-cleaning buildings.

System for controlling from gas house gas sent to engines and stoves.

Signals to boiler and engine operators.

Means of stopping ignition of engine in emergency.

Hourly registration by operator of cleaning house or inspection by watchman to determine operator's safety.

Automatic signal to warn operator of low-gas pressure.

BOILER-HOUSE SAFEGUARDS

Provision for securely stopping gas from leakage past valve through burner into boiler when shut off for cleaning.

Blanking or locking of boiler blow-off valves.

Gage-glass shields that can be rotated when the glass is being changed.

Inward-opening firing doors.

Escape pipes from pop safety valves.

Best wire-wound steam hose for blowing tubes.

Non-return valves on steam nozzle.

Gas mains placed outside boiler house.

Permanent railed platforms from boiler to boiler, and for water tender, or permanent ladders for use when gage glasses are changed.

Permanent platforms with ladder or other approach at frequently used valves.

Permanent platforms for tube blowers.

SAFEGUARDS FOR STOVES

Platforms at cleaning doors provided with means of approach that obviates climbing over top of railings.

Steps to top provided with frequent landings, with danger sign at bottom.

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Locks for gas burner, hot-blast valve, cold-blast valve, and chimney valve.

Provision for preventing leakage of gas from burner into stove.

Means of turning gas into stove without man standing too close to door.

Blow-off valve muffled or provided with a 16-foot vertical extension pipe.

Hot-blast valve counterweights guarded.

Permanent platforms at hot-blast valve seat and valve chamber head.

BLAST-MAIN SAFEGUARDS

Platform at gas relief valve on hot-blast main. Ventilator over valve if inside cast house.

Check valve in mixer pipe.

Butterfly valve in cold-blast main on furnace side of snort valve.

Oil drain from cold-blast line at stoves.

Two spring-loaded blast-relief valves on cold-blast line, adjusted to blow off at any desired pressure.

Steam connection to cold-blast line at engine-room.

Oil drain from cold-blast line at engine room.

Means of opening snort valve from outside of cast house.

Muffler on snort valve.

ENGINE-ROOM SAFEGUARDS

A whistle of distinct and different sound for each furnace blown from the same room, and a number corresponding to the furnace displayed simultaneously with the sounding of the whistle.

Device to prevent engines from turning over backward owing to pressure of blast.

Guarding of fly-ball governors, rocker arms, connecting and tail rods, cranks, and air-inlet valves.

Guarding of flywheels with 5-foot wire fencing, carried over the bearings.

Three-rope drive of governor.

Emergency stop.

Relief valve at each end of air tub.

Automatic oiling system.

Checkered platforms, with standard railings and non-slip safety treads on the steps from gallery to gallery of engines.

Air intake from outside or guarded with wire netting.

Blocking for cylinder and flywheels.

Oxygen breathing apparatus at gas-engine rooms.

Forced ventilation of gas-engine basement.

SAFEGUARDS IN CONNECTION WITH SLAG DISPOSAL

Valve for granulating-pit sprays placed at safe distance from runners and pits.

Tracks for cinder ladles covered at cast house.

Steam or air dumping of cinder ladle at dump. Devices on cinder ladle to prevent overturning in transit or loading.

Means of extinguishing burning clothing at cinder dump.

Cab on cinder crane so placed that it does not come over pit during travel of crane.

Prevention of steam from granulating pit from getting into cast house.

SAFEGUARDS FOR LADDERS

Keeping portable ladders at storeroom, numbering them, and issuing them upon a return requisition.

Equipping portable ladders with metal spurs at the bottom and hooks at the top.

Keeping rungs of permanent ladder at least 8 inches from walls, columns, or stacks.

Providing cages for all permanent ladders more than 18 feet high.

SAFEGUARDS FOR SCAFFOLDS

Removal of every piece of loose lumber from about plant.

Selecting scaffold lumber as lumber is shipped into plant, testing it for strength, marking it, and setting it aside for scaffold use only.

Placing scaffold lumber in store yard where it can be taken out and used only by authorized carpenters.

SAFEGUARDS FOR RIGGING MATERIAL

Chains, cable, rope, and slings given out only by tool man or boss rigger, who has tables of safe working loads.

Inspection of material by boss rigger or assistant every time it is returned.

Destruction of defective rigging material as soon as dangerous condition is ascertained.

Safety belts and lines, with wrought-iron snaps, buckles, and rings.

SAFEGUARDS FOR YARDS AND TRACKS

Elimination or guarding of all holes and depressions, close clearances, dangerous corners and doorways, walks and paths beneath cranes, and eaves of roofs near ladles being transported, poured, or loaded.

SAFETY APPLIANCES

General dispensary for first-aid treatment.

Stretchers at various points along trestles and in stock house, cast house, boiler and blowing room, shops, ladle house, and around pig machine.

Resuscitation apparatus.

One or more half-hour oxygen breathing apparatus.

Regular drill in first-aid measures and use of breathing apparatus, stretchers, and bandages.

MISCELLANEOUS SAFEGUARDS

Handles on crane hooks.

Wearing goggles or masks in handling slag and metal.

Box-toe shoes for men handling material.

Portable railings for manholes and trapdoors.

Portable runways, cleated, and 24 inches wide, in place of miscellaneous plank.

Metal covers on all ditches and sewers, especially hot-water sewers.

Portable danger signs for use when any work presents danger to men in the vicinity, or for temporarily hazardous furnace or other conditions.

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Don'ts for Paper Mill Employes

THE Menasha Paper Company, Ladysmith, Wis., has posted the following warnings, prepared by Harry Ballon, general manager, and Arthur Winnege, superintendent of the sulphite department:

MENASHA PAPER COMPANY

WOOD ROOM EMPLOYES

Don't wear your jacket outside your overalls. It might get caught.

Haste makes waste when you jump over a conveyor. Go around it, to prevent slipping or falling and spraining of an ankle or broken bones.

The continual habit of running on belts when the machinery is moving must be stopped. If it is necessary, have your foreman do it, as he is experienced and you are not.

You must not use an emery wheel. If you have a tool to sharpen the saw filer will do it for you. If you would do it yourself you could break the emery by improper handling, or could get emery dust in your eyes.

Throwing small particles, such as chips or bark, at your fellow workman is a serious matter and is not allowed. He might not only lose an eye, but the surprise in getting hit might cause him to fall or get his arm or leg in the machinery. Don't be afraid to report to the superintendent any violation of this rule.

If the lights should go out and it is too dark to see, stay where you are until they go on again, or until the machinery has stopped, otherwise you are in extreme danger of stepping through a hole, getting caught in the moving machinery, etc.

During noon hour, when you sit down to eat, choose a safe place.

Bear in mind that a wood room is one of the places in a paper mill where a large percentage of accidents occur, therefore be exceptionally careful.

ACID PLANT EMPLOYES

Riding on the elevator strictly forbidden. This class of machinery ranks near the top of the list as the most dangerous.

Have respect for fellow workmen by being careful when filling towers so that no rock will fall.

You will prevent fires and also prevent stumbling by keeping rubbish off stations or landings.

Visitors cannot go up the tower unless accompanied by superintendent or manager. We expect you to enforce this rule.

Holes in the floor on the stations must be repaired or immediately reported to the superintendent.

Prevent sulphur catching fire in front of burners. It might get into storage bins.

Filling elevator too high with stone will cause them to fall off. Be careful of the men working below.

Notify the superintendent immediately if elevator, gas line, burners, wiring or safety devices are not in working order.

BLOW-PIT EMPLOYES

Don't stay in blow-pit room when a digester is blowing off.

Don't have pit full of water when digester is ready to blow. It might cause the top to blow off.

Don't leave pits open when digester is blowing. Hot stock could burn some one nearby.

Don't neglect to notify the superintendent immediately if any safety device or piping requires repairing.

Don't go inside the blow-pits until you have notified the cook. Neglect to do this could cause severe burns and possibly death, because the cook might blow a digester on top of you, he not knowing you were in this danger.

Don't start engine too fast; turn steam on slowly and open drain cocks, because the water in cylinder could possibly blow out the head.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 339

VARIOUS INDUSTRIES—SELLING SAFETY.—Safety work in our plant is a "selling" proposition. The safety engineer and his two assistants, of whom the writer is one, work among the department superintendents and foremen and, in fact, among the whole body of employes in much the same manner as a salesman works his territory. We are not called "inspectors" at all, but are considered, both by ourselves and by the management, as safety "salesmen."

We do not force safety on anyone in the plant. We have no authority to sign safety orders of any description. Our business is to "sell" safety. We believe we have one of the most important lines to sell that is handled by any salesmen in the world; namely, human lives, arms, legs, fingers, eyes, etc. We sell a man his life and the parts of his body as well as his valuable working time, by getting him to pay a certain price for them. The price that we endeavor to get him to pay is CAREFULNESS. We try to convince him that it is a good bargain for him to expend the necessary effort to be careful, and in return for this effort we assure him greater likelihood of ability to continue at his work with all of his body in good condition.

The installation of guards and safety devices is handled in the same manner. When the placing of a guard is decided upon by the safety department no order is issued by the department, but the safety engineer or one of his assistants goes to the department superintendent or foreman concerned and "sells" him the idea by convincing him that he ought to install this guard as a price, in return for which he will receive freedom from accidents to his men at that particular place. The "sale" is clinched as in the broader field of salesmanship by getting the customer to sign his name on the dotted line at the bottom of the requisition or work order.

We believe this method is better than forcing the matter because a guard which is installed with the approval and good will of the man who is responsible for its maintenance and use will be more serviceable and less liable to abuse than when it is placed at the order of some one else.

A further analogy between our safety work and modern salesmanship is the fact that we advertise in every possible way. The following are the principal mediums:

Magazine Advertising—Every month we have a page in our plant "Bulletin," a 40-page monthly publication which goes to every employe.

Billboard Advertising—We have shop bulletin boards throughout the plant on which we post the bulletins of the National Safety Council and other bulletins that we make ourselves.

Electric Sign Advertising—Above the entrances to the plant we have large electric signs with changeable letters and on these signs we install safety slogans such as "Be Careful Today," "Think Safety," and "Avoid Danger." These are changed at frequent intervals.

Advertising Pamphlets—From time to time we send to all our foremen, accompanied by a personal letter, booklets and pamphlets bearing on safety, such as "Things You Should Know for Safety," prepared by Coroner Hoffman of Chicago.

Calendar Advertising—On January 1 we distributed to our employes 2,000 of the safety calendars prepared by the National Safety Council.

By this advertising campaign we

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create an interest in our safety "goods" and a desire for them. Hence when we go out among the men to sell a foreman the idea of a better guard or to sell a workman a safer method of doing his work we are better able to make our safety "sales."

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No. 340 VARIOUS INDUSTRIES—SAFETY BULLETINS.—The following bulletins may be of interest to the readers of SAFETY ENGINEERING, especially to The Man On The Job:

"WARNING TO ALL TRAINMEN"

"STANDARD AND NARROW GAUGE INDUSTRIAL EQUIPMENT"

In the interest of "Safety" you are hereby warned to use every care and precaution in the discharging of your duties.

Don't forget that each engine is provided with a bell and whistle and you cannot use them too often, as it is absolutely essential that you announce your approach.

Have your brakemen go in on the track and warn the men before you drop cars in.

Remember you are operating an industrial equipment where men are in constant danger if you are not cautious.

All brakemen are forbidden to jump a moving train or locomotive by standing in the path of the approaching train.

Flying switches are prohibited and none but authorized employes are allowed to ride on engines or cars.

Make this plant secure from danger at least from the standpoint of railroading and you have done your part.

DEPARTMENTAL INJURY REPORTS

On all accidents in your department, whether of a major or minor nature, it will be necessary for you to render a departmental or foremen's accident report in duplicate. The original copy to be presented to the hospital for the completion of their records, and the duplicate retained in your files for future use in comparing your records with the weekly report of accident statistics issued from this office.

By keeping a record of accidents occurring in your department, you will have the information for reference purposes and can readily ascertain the nature of the injuries together with decreases or increases.

Render a full descriptive report for each case, in order that the hospital staff can compile the data for its report to assist in making the proper distribution.

In the event of a serious injury, or one where it is necessary to have the injured man attended to without delay, the hospital attendant will call on you later for the report.

Please give this matter your prompt and continued attention.

LOCKING BOILER VALVES.

When about to make repairs or inspections of boilers, especially internal inspections, it will be absolutely necessary to lock the valves closed on the main steam line, feed line, etc., leading to and from boiler, so as to protect men who are making inspections or repairs.

The key to be kept in possession of the men in boilers.

THIS RULE TO BE STRICTLY ADHERED TO.

CLEANING HANDS WITH GASOLINE AND INFLAMMABLE OILS

We have a record of a severe accident at a plant where a pipefitter was in the habit of cleaning his hands with gasoline. At the time he was using the gasoline it ignited from a match lighted by a fellow workman.

In this connection we might mention the possibility of irritation of the skin by washing hands in oil; also of injuries which may be caused by small turnings or drillings in the oil around the machines, with possible blood poisoning if injury is neglected.

If this condition exists in your department we ask that you abolish the practice at once, as we do not want any accidents on our records which were caused through improper use of oils.

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No. 341 ALL INDUSTRIES—TEN RULES REGARDING APPLICATION OF TINCTURE OF IODINE TO WOUNDS.—1. Keep tincture of iodine (preferably one-half strength) in a rubber-stoppered bottle to prevent evaporation.

2. Control bleeding or wait until it begins to stop and the iodine will penetrate the wound spaces better.

3. Keep handkerchiefs, fingers, water, and other dirty materials out of the wound. If the part is greasy, flush wound with gasoline, benzine or kerosene, before using the iodine.

4. Apply iodine directly into the wound and for about an inch on surrounding skin. Be sure that it reaches all parts of a cut, punctured or lacerated (torn) wound.

5. Do not soak the dressing with iodine—simply put on a dry, sterile, surgical dressing after the iodine dries. Do not bandage too tightly.

6. Do not "mix drinks." Iodine only should be applied by the first aider. Avoid drug combinations generally except on physician's advice.

7. Do not apply iodine too often. Once a day is usually more than enough, regardless of how many times the dressing needs to be changed.

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8. Do not apply iodine on section of exposed intestine, in eyes, or entirely over bruises (except lightly where blood spots show on skin).

9. Use iodine and apply dressing as soon as possible. Remember that iodine is considered 100 per cent efficient if used within thirty minutes after infliction of injury. Sterile dressings are important.

10. Remember that the small wounds which are too often ignored frequently result in severe local or general "blood-poisoning." Regard them with respect and fear and treat them early by all means.

TEN IMPORTANT RULES IN DEALING WITH FRACTURES.—1. Do not remove a man even a few feet, before properly securing the broken bones in place. Violation of this rule, notably in fractures of lower limb, may cause a far worse condition.

2. Carefully cut away clothing from the location of a fracture—look for the often present wound and possible bleeding—apply iodine and sterile dressing to wound; then apply carefully padded splints.

3. Do not "poke around" or otherwise handle injured part too much when seeking to locate exact spot of the break.

4. If in any doubt as to whether a fracture exists, give the patient the benefit of the doubt and treat the injury as a possible fracture. It is the only safe way.

5. Do not attempt to "set" a fracture in first aid work. All you are expected to do is to use the best means at hand to keep the injured part quiet and in the best possible alignment.

6. Fracture of leg—catch across toes with one hand, behind heel with other, and gently straighten; fracture of forearm—grasp above elbow and at hand: upper arm—grasp below elbow and at shoulder. Hold carefully and let another man apply splints. Do not allow patient to dictate a favorite method of his own, or let his condition prevent you from treating him. Fracture of ribs—tie coat around chest.

7. If there is a compound fracture—that is when open wound is also present—dress this first by all means. If bone protrudes, do not wash with water nor attempt to replace. On the other hand, place a sterile gauze pad underneath and over protruding end of bone, so that it will not return within.

8. Be sure to pad splints carefully with anything at hand. Properly done, this insures more immediate comfort and does much to prevent pain when the inevitable swelling occurs afterward. If fingers or toes get blue and cold, gently loosen the splint bandages a trifle.

9. In applying bandages around splints in case of broken leg, do not raise the leg; slide them underneath with a flat, thin stick, and tie knots on the outside splint. Apply firmly, but not too tightly. Watch the condition of fingers and toes.

10. Always look out for and treat shock. Lower the head, loosen the clothing, keep the patient warm, handle gently and as little as possible. Avoid too much stimulation, and do not get in too much of a hurry. Always keep this rule in mind, not only in fractures but in other serious emergency cases. The only exception being in skull injuries, to raise the head instead of lowering it. Follow other treatment as given above.

TEN RULES FOR PREVENTING BLOOD POISONING.—1. Never fail to give attention to a wound, no matter how small.

2. Never drag clothing over a wound, but cut and pull it away carefully. Watch for extra bleeding at this stage.

3. Never put fingers or dirty materials in a wound for any purpose.

4. Do not "wash out" a wound with water. It carries germs and is dangerous.

5. Keep handkerchiefs and similar dirty dressings away from wounds. If nothing surgically clean is at hand, leave it exposed to the open air: such is the safe way.

6. When a physician is not immediately available, apply tincture of iodine in the wound and for an inch around margin of same, except in the case of exposed intestines, eye injuries and ordinary bruises.

7. Apply carefully a sterile, surgically clean first-aid dressing to the wound. Do not contaminate with dirty hands or clothes. Do not bandage too tightly.

8. Whenever dressings become soiled,

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loose, wet or otherwise uncomfortable, carefully apply a fresh dressing.

9. If swelling and pain develop in or about the wound, see a physician immediately. To delay is dangerous.

10. Remember that more than 75 per cent of all cases of local and general "blood poisoning" develop from small injuries, especially in the hand. Use common sense—luck cannot be relied upon.

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No. 342 VARIOUS INDUSTRIES—NAILS IN WALLS AND SIDES OF CUPBOARDS. — In making weekly safety inspections of our factory I have noticed a number of nails driven in the walls, and sides of cupboards, etc., on which different articles are hung from time to time.

It had never occurred to me that these same nails were hazardous and liable to be the cause of an accident, yet it was found that they could cause accidents.

One of our employes in stooping to pick up a piece of cloth which fell alongside of a cupboard, just missed striking his eye on a nail on the outside of the cupboard. The "Goddess of Luck" hovering over him probably saved this man from losing an eye, and he suffered only a bad laceration of the cheek.

We have made a factory rule that all nails, etc., of this kind be placed at least 6 feet from floor level, and I trust this little article may be the means of helping other factories to protect their employes from a danger that would probably not be thought of unless special attention were called to it.

Prizes for February Articles

First Prize. No. 338. *W. N. Lipscomb, Field Representative, American Red Cross, Washington, D. C.*

Second Prize. No. 335. *R. F. Symonds, Works Manager, New England Structural Company, Everett, Mass.*

Honorable Mention. A tie. No. 330. *J. Verner, Linden, N. J. No.* 336. *H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio. No.* 337. *W. N. Lipscomb, Field Representative, American Red Cross, Washington, D. C.*

Other meritorious articles were contributed by Irwin B. Homan, Lebanon, Pa.; Dr. Edward R. Hunter, Representative, First Aid Division, American Red Cross, Washington, D. C.; H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio and H. J. Bradley, G. N., Superintendent, Company Hospital, Chester Shipbuilding Company, Ltd., Chester, Pa.

Comments by Members of the Committee

In deciding in favor of Article 335, I believe there is a strong tendency on the part of repairmen to neglect to put safety guards back in the place where they originally found them. It is especially true, when repairs are made at night that safety guards are often left on the floor—and the sweeper gathers them up and throws them into the fire room.

Time and again I have had to replace guards that were pulled down, in order to take up a belt or put on a pulley. The men who did the repair work should have replaced the guards before going on to another job. I think, if the importance of replacing guards when torn down instead of allowing them "to grow into disuse," as the writer of Article 335 states, were impressed upon those whose duty it is to make such repairs, plants would be much safer as a rule.

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My choice is Article 337, for the reason that the writer exposes a condition that is, after several years of energetic effort, still too prevalent. A more dangerous character than the knocker, who does his work openly, is the man directly in charge, who, when approached on the

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subject of safety, is loud in praise of it, says that it is a good thing and that we cannot have too much of it—and then probably gives an employe an unpleasant look, because he has ventured to call attention to an unsafe condition or practice. From men, such as described, we get merely a passive toleration of safety work, instead of an active, whole-hearted and enthusiastic co-operation and assistance. But there are signs that their time is getting shorter. By all means eliminate the knocker, whether he carries a brass or a velvet hammer.

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Article 335 fits the solution of "Safety First." The writer gets down to the success of all of our earnest endeavors to guard the employes from injury, and the point brought out is the backing of the manager in what we do to safeguard the plant. If the management stands back of what we conscientiously believe is right (and does not make a pretense to cover itself by getting past lawsuits) and really and truly make the men believe that it is looking after their interests, then all will be well. What we want, now and always, is to get encouragement in what we undertake.

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Article 335 is my choice because, besides advocating the better safety education of the worker and the increased use of mechanical safeguards, it advises periodical inspection of equipment. These three items, backed by a sympathetic management as pleaded for, would soon produce a safe plant.

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Article 338 is timely. It would be better for this country if more saw safety work in that light. Article 337 is my second choice.

PORTABLE SAFETY RAILINGS.—The safety railings shown in the above illustration, used by the Illinois Steel Company, are especially designed to be moved from place to place and are used by the Yard Department as temporary barriers during construction and about excavations. The railings are solidly built and balanced and the side bars may be adjusted to a desired length.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

BAKERIES AND CANDY FACTORIES

January 4, 1918. Galesburg, Ill. McCollum Brothers. 75-79 South Chambers street. Manufacturing candy. Half of one 2-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, rubbish in boiler room and around elevator shaft. Fire started in boiler room. Discovered by a switch tender in railroad yards about 7:20 p. m. Alarm, telephone. Duration, 3 hours. Stopped at north half of building. Fire was favored by openings in fire wall. Private fire apparatus, 3-gallon extinguisher. Persons in building, none. Means of escape, stairways. Value of building and contents, $60,000. Valuable papers all saved.

January 1, 1918. St. John, N. B. Hamm Brothers. Main street. Manufacturers of crackers and cakes. Two buildings destroyed and a third one damaged; all 4 stories. Walls, brick and frame. Floors, wood. Roofs, gravel. Cause, unknown. Fire started near center of building. Discovered by passerby about 10 p. m. Alarm, box. Duration, about 8 hours. Stopped on same property where it started. Fire was somewhat retarded by brick wall of adjoining building. Firemen handicapped by extreme cold—temperature below zero. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, about $40,000. Property loss, $40,000. All valuable papers protected.

COAL AND LUMBER YARDS

December 31, 1917. Lehr, N. D. Thompson lumber yards. East side of Main street. Lumber yard and implement house. Two 1-story buildings destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in lumber yard. Discovered by seeing the flames about 4. a. m. No fire department. Duration, 5 hours. Stopped at implement building. Fire was favored by inflammable construction. Private fire apparatus, water and snow. Persons in building, none. Means of escape, 1-story buildings only. Value of buildings and contents, $20,000. Property loss, total.

FOUNDRIES AND MACHINE SHOPS

January 2, 1918. Jamestown, N. Y. Curtis Machine Company. East 2nd street. Manufacturing machinery. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood, Barrett Specification. Cause, supposedly overheated stove: owners suspect incendiary. Fire started in east end of 2nd story. Discovered by neighbors across the street about 4:35 a. m. Alarm, telephone. Duration, 2 hours, 30 minutes. Stopped after roof at one end had collapsed. One end of 2nd story damaged. Fire was favored by open construction; no partitions. Also oil-soaked floor and work benches. Firemen handicapped by severe cold. Persons in building, none. Injured, 1 fireman by falling beam. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $111,000. Property loss, about $30,000. Fire did not reach office so no valuable papers were lost. Company was at work on a carving machine to be used in the manufacture of propellers for aeroplanes. The machines were in opposite end of building from where the fire started and were not damaged.

GARAGES AND AUTO REPAIR SHOPS

January 7, 1918. Philadelphia, Pa. Garage of Philadelphia Screen Company. Paschal avenue and 56th street. One 1-story building damaged. Walls, brick. Floors, cement. Fire started in automobile. Discovered by employe about 1:29 p. m. Alarm, telephone. Duration, 1 hour, 10 minutes. Stopped after destroying 3 automobiles. Fire was favored by gasoline, oils, etc. Private fire apparatus, Pyrene and portable fire extinguishers. Persons in building, not stated. Means of escape, 1-story building only.

GRAIN ELEVATORS

January 1, 1918. Van Wert, Ohio. S. B. Brandt. Fulton street and C. N. R. R. Grain elevator. One 3-story building destroyed. Walls, wood covered with sheet iron. Floors, wood. Roofs, sheet iron. Cause, unknown. Fire started in feed room on ground floor. Discovered by citizen who saw fire breaking through siding about 10:40 p. m. Alarm, telephone. Duration, 32 hours. Stopped after building was destroyed. Fire was retarded by sheet iron covering which prevented fire from spreading to adjacent property. Private fire apparatus, 3 barrels salt water. Persons in

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building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $35,000. Property loss, $30,000. Valuable papers were kept in fireproof safe.

HOTELS AND LODGING HOUSES

December 27, 1917. Monterey, Cal. Pebble Beach Lodge. Four miles outside city. Cafe and lodge—branch of Hotel Del Monte, Monterey. One 1-story building destroyed. Walls, logs and wood. Floors, hardwood. Roofs, shingles. Cause, unknown. Fire started in kitchen. Discovered by watchman about 1:20 a. m. Alarm, telephone. Duration, about 3 hours. Stopped when building was consumed. Fire was favored by all wood construction. Firemen handicapped by distance to travel—auto pumping engine responded; prevented further spread of fire. Private fire apparatus, only length of fire-hose for standpipes; water pressure was low. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $65,000. Property loss, $32,500. Valuable papers were protected. Fire chief says: "Lodge will be rebuilt from new plans with better construction. Large water mains are being laid and standard fire hydrants placed. Abundant water supply and about 100 pounds pressure."

January 20, 1918. Calumet, Mich. Calumet Hotel. Calumet avenue. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, unknown. Fire started outside of kitchen. Discovered by kitchen maid about 1 p. m. Alarm, telephone and Gamewell system. Duration, 7 hours. Stopped at attic. Fire was favored by all wood construction, but isolated location prevented spread of fire. Firemen handicapped by lack of water. Private fire apparatus, that of the Calumet & Hecla Mining Company. Persons in building, uncertain. Injured slightly, 2 firemen. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, about $25,000.

January 22, 1918. Bangor, Me. Colonial Hotel. Union and High streets. One 4- and 5-story building destroyed. Walls, lath and plaster. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in guest room in 4th story. Discovered by guest about 12:25 p. m. Alarm, telephone. Duration, between 12 and 14 hours. Stopped when building was destroyed. Fire was favored by all wood construction and without fire-stops of any kind. Private fire apparatus, fire hose. Persons in building, not known. Injured, 4 or 5 firemen. Means of escape, fire escapes. Value of building and contents, $85,000. Property loss; total.

IRON AND STEEL MILLS

January 6, 1918. Chatham, Ont. Pittsburgh & Des Moines Steel Company. Inshes avenue. Bridge and steel works. One 1-story building (40 feet in center) partially destroyed. Walls, concrete and wood. Floors, cement. Roofs, asphalt and tar paper. Cause, unknown. Fire started in engine room. Discovered by engineer about 1:45 a. m. Alarm, telephone. Duration, 1½ hours. Stopped after destroying about ⅛ of building. Fire was favored by open space. Firemen handicapped by distance—1,200 feet—to nearest hydrant. Persons in building, 25. Means of escape, windows and doors. Value of building and contents, $45,000. Property loss, $15,000. Valuable papers were protected.

January 29, 1918. Marquette, Mich. Pioneer Iron Furnace Company. East end of Wright street. Refinery. Two buildings destroyed; 1- and 3-story. Walls, brick veneered. Floors, concrete. Roofs, trussed wood covered with graveled ruberoid. Cause, explosion. Fire started at north end of building. Discovered by noise of explosion about 1:50 a. m. Alarm, telephone and alarm box. Duration, about 7 hours. Stopped in ends of two adjoining buildings which had been shattered by the explosion. Fire was retarded by construction of buildings, but the contents of wood alcohol and acetone burned with intense heat and momentary danger of further explosions. Firemen handicapped by lack of water pressure, as feed mains were blown off by explosion and walls were blown on to gate valves controlling sprinkler system, thus rendering it impossible to shut off the water. Private fire apparatus, complete hose equipment and private pumping equipment—daily capacity 15,000,000 gallons. Persons in building, 2. Means of escape, doors and windows. Value of buildings and contents, $475,000. Property loss, almost total.

MANUFACTORIES, MISCELLANEOUS

January 27, 1918. Philadelphia, Pa. Union Ribbon Carbon Company. 67 Laurel street (rear). Manufacturing typewriter ribbons—Miller Candy Company in same building. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tar. Cause, unknown. Fire started in 1st story. Discovered by passerby about 4:49 a. m. Alarm, box. Duration, about 11 hours. Stopped in building of origin. Private fire apparatus, hose lines. Persons in building, none. Means of escape, outside fire escape.

MERCANTILES, MISCELLANEOUS

December 29, 1917. Burlington, N. C. Williamson Company. Davis street. Wholesale dealers. Two 2-story buildings destroyed. Walls, brick. Floors, cement and wood. Roofs, wood and gravel. Cause, unknown. Fire started in 2nd story. Discovered by night watchman about 4:15 a. m. Alarm, box. Duration, 4 hours. Stopped at adjoining building. Fire was retarded by substantial construction. Persons in building, none. Means of escape, none. Value of buildings and contents, $80,000.

January 14, 1918. Chicago, Ill. West Side Wholesale Grocery Company. 2139-41 South Kedzie avenue. Wholesale grocers. One 2-story building damaged. Walls, brick. Floors, wood, open joists. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered

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by watchman about 6:40 p. m. Alarm, telephone and box. Duration, about 4 hours. Stopped at 2nd story. Fire was favored by open stairway and elevator shaft in center of building. Firemen handicapped by cases of goods piled ceiling high, doors and windows also blocked with goods. Persons in building, watchman only. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $140,000. Property loss, $40,000.

MERCANTILES, TENANT BUILDINGS

December 30, 1917. Pittston, Pa. Business building. Main and Broad streets; center of business district. Shoe store, candy shop, Woolworth 5- and 10-cent store, offices and lodge rooms. One 2- and 3-story building destroyed. Walls, brick and cement. Floors, wood. Roofs, metal. Cause, defective chimney in center of building. Fire started in center of Woolworth store between 1st and 2nd stories. Discovered by passerby about 1:15 a. m. Alarm, box. Duration, 9 hours. Stopped in building of origin. Fire was favored by flimsy construction—a fire-trap. Firemen handicapped by extreme cold—10 degrees below zero—and insufficient number of exits. Private fire apparatus, sand pails and extinguishers. Persons in building, 3—janitor's family who lived in the rear. Killed, 1. Injured, 1; 8 firemen frostbitten. Means of escape, 3 exits, front, rear and one side. Value of building and contents, $50,000. Property loss, total.

METAL WORKERS

January 1, 1918. Cincinnati, Ohio. Phillips & Richter. 114-16 West 6th street. Manufacturing jewelers; gas supply company in same building. One 6-story building destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, unknown. Fire started in 6th story. Discovered about 2:46 a. m. Alarm, box. Duration, about 9 hours. Persons in building not stated. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents estimated at $100,000.

January 9, 1918. Columbus, Ohio. American Chain Company. Long and Scioto streets. Manufacturing chain. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, thawing water pipe with torch. Fire started in center of 1st story. Discovered by employes about 4:15 p. m. Alarm, box. Duration, under control in 3 hours. Department remained 11 hours. Stopped in building of origin. Fire was favored by wood construction and oil-soaked woodwork. Persons in building, not known. Killed, 2. Injured, 1 fireman. One employe burned to death and one died later from effects of smoke. Means of escape, not reported. Property loss estimated at $125,000.

SCHOOLS AND COLLEGES

January 14, 1918. Kittanning, Pa. Second Ward school. Vine and McKean streets. Public school. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, overheated flue. Fire started in hot air flues. Discovered by seeing smoke issue from registers about 10:30 a. m. Alarm, regular system. Duration, about 5 hours. Stopped when building was consumed. Firemen handicapped by low water pressure. Persons in building, about 850. Means of escape, fire escapes, but occupants marched out by way of the stairs. Value of building and contents, approximately $100,000. Property loss, $75,000 to $100,000.

TEXTILE MILLS

December 21, 1917. Lewiston, Me. W. S. Libbey Company. Cotton manufacturers. Part of one 6-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and slate. Cause, friction from machinery. Fire started in 5th story. Discovered by workman about 10:55 a. m. Alarm, telephone and street box. Duration, 2½ hours. Stopped in northwest wing of building. Firemen handicapped by difficult traveling and the fact that automatic sprinklers had been cut off. Private fire apparatus, standpipe and hose. Persons in building, 153. Means of escape, outside fire escapes. Value of building and contents, $351,292. Property loss, $43,937. Papers of value were adequately protected.

THEATERS AND AMUSEMENT PLACES

December 29, 1917. Buena Vista, Ga. Several business buildings. Motion picture theater, printing office, dry goods store, Red Cross rooms. Four 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, picture machine. Fire started in picture booth through carelessness. Discovered by operator of projecting machine about 8:15 p. m. Alarm, telephone. Duration, 4 hours. Stopped at Forsyth and McDuffie streets. Fire was favored; volunteer fire department only. Persons in buildings, 40. Means of escape, stairways. Value of buildings and contents, $65,000. Property loss, total.

January 9, 1918. Chicago, Ill. Chicago Theater. 2122-24 West Chicago avenue. Motion picture theater and hall. One 2½-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and gravel. Cause, unknown. Fire started in basement. Discovered by citizen about 12:27 a. m. Alarm, telephone. Duration, 10 hours. Stopped when building was consumed. Fire was favored by flimsy construction. Firemen handicapped by snow piled 8 to 10 feet high on sidewalks and streets. Persons in building, none. Killed, 5 firemen. Injured, 5, one of whom died later. Means of escape, fire escape. Value of building and contents, $30,000. Property loss, $6,000.

January 24, 1918. Brainerd, Minn. Various buildings. Front street. Motion picture theater and pool hall. Five 2-story buildings destroyed. Walls, brick and frame. Floors, wood. Roofs, wood. Cause, unknown. Fire started in basement. Discovered by smoke

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issuing from buildings about 2:20 a. m. Alarm, telephone. Duration, 4 hours. Stopped when buildings were consumed. Fire was favored, as two of the buildings were L-shaped with an open basement under all. Firemen handicapped by dense smoke, and the fire had burned through walls before it was discovered. Persons in building not stated. Means of escape, front and rear stairways. Value of buildings and contents, $50,000. Property loss, $50,000.

January 26, 1918. Peterboro, Ont. Royal Theater and two other buildings. 344-360 George street. Motion picture theater, bank and offices, meat market and shoe store. Three 3-story buildings destroyed. Walls, brick, fire walls between. Floors, hardwood. Roofs, tar and gravel. Cause, unknown. Fire started in basement of shoe store near elevator shaft. Discovered by clerk in store across street about 5:35 a. m. Alarm, telephone. Duration, 10 hours. Stopped at Royal Theater. Fire was favored by mansard roofs on all the buildings. Persons in building, 1 (watchman of theater). Injured, 1 fireman overcome by smoke. Means of escape, fire escape at rear of bank building. Value of buildings and contents, approximately $317,000. Property loss, approximately $257,000. Valuable papers were protected.

KILLED AND INJURED IN FIRES

December 30, 1917. Pittston, Pa. Business building. One life lost, 1 person injured, 8 firemen frostbitten.

January 2, 1918. Jamestown, N. Y. Curtis Machine Company. One fireman injured by falling beam.

January 9, 1918. Chicago, Ill. Chicago Theater. Five firemen killed; 5 persons injured, one of whom died later.

January 9, 1918. Columbus, Ohio. American Chain Company. One employe burned to death, one died later from effects of smoke. One fireman injured.

January 20, 1918. Calumet, Mich. Calumet Hotel. Two firemen slightly injured.

January 22, 1918. Bangor, Me. Colonial Hotel. Four or five firemen injured.

January 26, 1918. Peterboro, Ont. Royal Theater and other buildings. One fireman overcome by smoke.

Letters to the Editor

COOLING TOWERS ON ROOFS

To the Editor of Safety Engineering:

Sir:—A concern manufactures a cooling tower which is in most cases erected on the roof of the building. Heretofore these towers have been made of steel throughout, and were absolutely waterproof. Owing to the present high price of steel, wooden construction has been demanded, and in some cases the entire interior has been built up of a very compact series of wooden slats. This wood surface is perfectly safe when the tower is in operation as it is flooded with water. All these towers, however, are shut down for varying periods at some time or other, and at those times are, of course, dry and inflammable. The outside of the tower is steel and galvanized iron but not entirely closed in. It was thought, however, that possibly the construction was absolutely safe against fire. It was found, however, that within the last month or so, a tower of this construction was completely destroyed, having been set on fire by a spark from a passing locomotive. The building itself was fortunately saved owing to the roof at the time being covered with ice and snow.

1. Is it considered a fire hazard to install wood construction in a cooling tower on the roof of a building in which the frame work may be of steel but the interior wood?

2. In case such wood construction as above mentioned is installed, will this increase the insurance rate on the building, contents, etc., and if so, in what proportion?

We will be glad to have your assistance in getting such information as we can on the subject, and if the matter is not entirly clear to you please let us know. C. A. B.

March 2.

REPLY BY SAFETY ENGINEERING

Safety Engineering replies to the two questions as follows:

Question 1. Yes. Any construction involving the use of combustible material is more hazardous than if

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non-combustible material is used. The hazard also increases as accessibility decreases. "Kindling wood" construction, i. e., much subdivided woodwork like slat work, slatted ventilators and the like, implies the maximum of structural fire hazard.

In the case mentioned by our correspondent there appears to be opportunity for external exposures to act. The nature of the construction and the arrangement of woodwork favors extremely rapid combustion and these unfavorable features are further enhanced by the comparative inaccessibility (above roof). Apparently the wooden slat work increases the fire hazard materially.

QUESTION 2. It should increase insurance rates. The precise value of the extra hazard, expressed in terms of insurance rate, is, however, a matter belonging solely to the rating body of the underwriters having local jurisdiction. No opinion of any other person would be of value or binding effect, but whatever penalty for inferior construction is imposed in the way of advanced rates will apply to the buildings and all contents and possibly effect an increase of rate on adjacent structures. An inquiry addressed to the secretary of the insurance rating organization having jurisdiction over any territory in which such construction exists should bring a satisfactory reply.

SUGGESTION: It appears possible that a suitable non-combustible material can be found for slats carried on steel framework that will at least be intermediate in cost between steel and wood. Some material of the general nature of "transite board" may perhaps be used to advantage. We are not in a position to quote any specific instances of such use, but the manufacturers may be able to do so.

Safety in Exhaust Devices

SAFEGUARDS for the protection of workers in shell loading plants against poisoning from handling of the deadly "T. N. T." which forms the basis of most of the high explosive shells used by the Allies on the western front, have recently been put into effect under the supervision of the Bureau of Hygiene and Sanitation of the New Jersey State Department of Labor. So thorough have been the precautions taken that the danger in handling the chemical has been reduced to the minimum, although not entirely eliminated. Fifty per cent of the high explosive shells used by the Allies are loaded in America, is a statement made by John Roach, chief of the Bureau of Hygiene and Sanitation, and the greater part of the loading is done in New Jersey. It did not become known until after many workers had died in England that the explosive is poisonous by absorption. Now trinitrotoluol is considered one of the most dangerous trade poisons used in industry, and its handling without proper precautions a menace because the health of the operators is seriously impaired from breathing the dust or fumes, or from coming in contact with the substance. New Jersey has adopted regulations covering the production and handling of nitro or amido compounds, of which "T. N. T." is one. In carrying out these regulations the loading plants have installed mechanical exhaust devices to draw off the fumes and dust, have provided their workers with gloves for protection, and make monthly medical inspections which it is hoped may discover symptoms of the evidence of poisoning before any cases advance to a serious stage.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

FERALUN SAFETY TREADS

There are on the market a number of different styles of safety treads and now that the slipping hazard is being recognized throughout the country as a prolific source of accidents, due primarily to slipping or tripping, the safety tread is receiving more and more attention from accident preventionists.

The American Abrasive Metals Co., 50 Church street, New York, manufactures the "Feralun" safety tread, which meets all requirements for providing a slip-proof surface and in addition possesses remarkable wearing quality. The essential requirement of a safety tread is that it offers no smoothed surface. In other words, its whole surface should be such that no matter where the foot of the walker touches it, there is no chance of slipping. The Feralun tread meets this requirement, for it exposes a hard, rough surface without parallel grooves. The principle of the Feralun tread is in accordance with the best safety engineering practice, and for this reason the demand for the Feralun tread is rapidly increasing.

THE SAFETY METHOD

The Safety Machinery Corporation, 10 West 23rd street, New York City, for some time has been manufacturing the Safety-Economy sewing machine. This is designed for large establishments where a number of sewing machines are in use and where the danger to the operators is a hazard of large proportions.

The main features of the Safety Method are that the dangerous belting and shafting have been done away with, the machines being driven by a single power shaft which is enclosed and which is claimed to reduce power cost, as it does away with the transmission belts, etc., formerly used on these machines. Another important feature is that by the removal of the shafting and dangerous machinery, the drippings of oil and grease are also done away with and thus a fire hazard, which is ever threatening many of the textile houses, is removed.

Further information may be obtained from the manufacturer, who has prepared an illustrated booklet on this new safety product.

PREVENTING ELEVATOR ACCIDENTS

In the prevention of elevator accidents we must realize that we are dealing very largely with that elusive and difficult unit, the human equation. Unlike the operation of a punch-press, circular-saw, lathe or other machine, where usually only a skilled workman operates the machine, thousands of elevators every day are operated by persons totally unacquainted with the mechanism or operation of an elevator. An elevator operated by such a person is transformed into a dangerous machine, and it is largely from such causes that elevator accidents happen. Despite rules to the contrary, this chance-taking on elevators goes on. The only sure remedy for preventing the chance-taker from operating an elevator is for the trained operator to lock the car at all times during his absence.

The Angell Elevator Lock Co., Atlantic avenue, Boston, Mass., has specialized for many years in the manufacture of elevator safety locks and stops. An elevator equipped with this device can be rendered immovable whenever desired and this valuable safety device has undoubtedly prevented a great many accidents which would have happened if the elevator could have been moved by a chance-taker during the operator's absence.

FOR FIRST AID WORK

The C. A. Mosso Laboratories, 2253 Warren Avenue, Chicago, Ill., have placed on the market what is claimed to be a valuable asset to the first aid kit in the form of their "oil of salt." This product may be used as a liniment, or may be used where the flesh is burned, cut or infected. Its sanitary ingredients are valuable in that it will destroy infections or poison and will cleanse the bruise or cut of foreign matter which may prove harmful to it. This constitutes a most important feature of this preparation.

The C. A. Mosso Laboratories will be glad to furnish more detailed information regarding their product to those interested in first aid and medical work.

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INDUSTRIAL FLOOD-LIGHTING

The Electric Service Supplies Co., 17th and Cambria streets, Philadelphia, Pa., manufactures the "Golden Glow" and "Crystal Mirror" Flood Light Projectors. These are two distinct types of projectors, each designed for a different purpose. The "Golden Glow" Projectors have their reflectors made from a special glass of greenish-yellow color. When in operation they project a soft golden-yellow light. The "Crystal Mirror" Projectors, on the other hand, have reflectors made from crystal clear mirror glass. They project a flood of white light.

The manufacturers suggest that the white "Crystal Mirror" light be used where it is desired to light the subject as a whole. The light of the "Golden Glow" Projectors should be used where it is is desired to disclose fine detail. Detailed literature on this subject may be obtained from the above manufacturers.

WIRE GUARDS FOR MACHINERY

The importance of having reliable and substantial guards for running machinery which is exposed, is recognized by every manufacturer who has considered the safety of his workers. Many different materials and ideas have been used in guarding machinery. The wire or mesh guard has met with general approval, as it affords a guard which not only protects the workmen, but permits inspection of the moving parts of the machinery without removing the guard. Another feature of the wire guard is that it permits the circulation of air into the machinery, thus eliminating to a certain extent the clogging of machinery from accumulated dust, etc.

The Norwich Wire Works, Inc., Norwich, New York, has manufactured a line of wire machine guards which are designed to meet the requirements necessary to the makeup of a reliable guard. This company will be pleased to furnish further information upon request.

THE "PERFECT" SHOP BARREL

The handling of barrels in industrial plants is often attended by mashed or bruised fingers on the part of the workmen who are handling the barrels, when the heavy weight of the barrel and its contents happens to slip, or when the workman is unable to obtain a firm grasp on the barrel. To eliminate the possibility of these handling accidents, the Detroit Range Boiler Company, of Detroit, Michigan, has manufactured a shop barrel known as the "Perfect." This barrel is constructed with a bilge at both ends and about the middle of the barrel, so that a man handling this barrel will be able to grasp it firmly and avoid the possibility of the barrel slipping and crushing his fingers.

The Detroit Range Boiler Company has prepared a booklet dealing with the advantages to users of this barrel which may be had upon request.

STANOLIND SURGICAL WAX

The Standard Oil Company, Chicago, Ill., is placing on the market an aseptic paraffin dressing for burns, which should be of interest to medical and first aid men. The treatment of bad burns in industrial plants has long been the source of much trouble for the first aid or industrial medical man. "Stanolind" is claimed to be a pure aseptic paraffin, prepared from a crude petroleum base, and will give relief to the injured member as soon as applied.

This dressing should be of value to first aid men, especially in industries where the hazard of burns or scalds, by fire or metal exists. The above-mentioned company will be glad to send an illustrated booklet describing "Stanolind" to those interested in the treatment of dangerous burns.

MOVING PICTURES IN SAFETY CAMPAIGNS

The fact is pretty generally conceded now among those who are spreading the gospel of safety, that safety moving pictures are a valuable help at safety meetings, and often make a deep impression upon the audience. A number of large corporations have made safety films for the education of their employes in their accident prevention campaign and the results from showing these safety films have been excellent. In order that a film may be shown to the best advantage, two requirements are essential, namely, a first-class film and a first-class projecting machine.

Probably no films are so important in detail as safety films, for the reason that to illustrate just how men are hurt in industrial operations, it is often a small gear, a man working without goggles, an exposed set-screw or some other small object is what causes the accident, and it is this small object which is the most important feature of the picture. Only a first-class projecting machine can properly present the small but most important details.

The Nicholas Power Company, 90 Gold Street, New York, has given very careful attention to such requirements and has incorporated in the 6B model of the Cameragraph a number of features which give perfect projection. This machine is now being extensively used at safety meetings for showing safety films. In addition to the high development of its projection qualities it is considered a very safe machine to operate, as the fire-prevention attachment prevent the possibility of the film burning should it catch fire from any cause.

The Nicholas Power Company also manufactures the "Excelite" lamphouse for the Cameragraph which is another distinct feature of this machine. It is equipped with a high wattage Incandescent Lamp and furnishes an abundance of brilliant white light, which is important in bringing out the details of the film projected in the best manner.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

SHEET METAL FIRE WINDOW MULLIONS—Hopmann Cornice Co., Mfr., 2571-73 Benton St., St. Louis, Mo.

SHEET METAL FIRE WINDOW MULLIONS—Bayer, J. C., Mfr., Front & Market Sts., Portland, Ore.

SHEET METAL FIRE WINDOW MULLIONS—St. Paul Roofing, Cornice & Ornament Co., Mfr., S. End Wabasha St., Bridge, St. Paul, Minn.

SHEET METAL FIRE WINDOW MULLIONS—Stremel Bros. Roofing & Cornice Co., Mfr., 1215 Washington Ave., N. Minneapolis, Minn.

SHEET METAL FIRE WINDOW MULLIONS—Weyand Co., Inc., Henry, Mfr., 16-24 Jefferson St., Waterbury, Conn.

SHEET METAL FIRE WINDOW MULLIONS—Lupton's Sons Co., David, Mfr., Allegheny Ave. and Tulip St., Philadelphia, Pa.

SHEET METAL FIRE WINDOW MULLIONS—Thorn Co., J. S., Mfr., 20th and Allegheny Aves., Philadelphia, Pa.

SHEET METAL FIRE WINDOW MULLIONS—Clark Co., Wm. D. Mfr., 305 Fourth Ave., Brooklyn, N. Y.

SIGNS—Myers Co., The, Elwood, Mfr., Springfield, Ohio.

SIGNS—Brumfield Electric Sign Co., Mfr., 18 Seventh St., San Francisco, Cal.

SWITCH BOXES—Palste Co., H. T., Mfr., 32nd and Arch St., Philadelphia, Pa.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Canadian Metal Mfg. Co., Ltd., Mfr., 144 Inspector St., Montreal, Que.

SLIDING OR SWINGING SHEET METAL FIRE WALL DOOR—Merchant & Evans Co., Mfr., 2019 Washington Ave., Philadelphia, Pa.

SWINGING SHEET METAL SHUTTER—Salmo Fire Door & Shutter Co., Mfr., 2025 Elston Ave., Chicago, Ill.

ENCLOSED SWITCHES—Square D. Co., Mfr., Detroit, Mich.

ENCLOSED SWITCHES—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

FRAMES, SINGLE TYPE—Leonard Sheet Metal Works, Mfr., Head of Ferry St., Hoboken, N. J.

FUSIBLE LINKS—General Fire Extinguisher Co., Mfr., Providence, R. I.

GLOBE ALARM CHECK VALVE, MODEL E.—Globe Automatic Sprinkler Co., Mfr., 2019 Washington, Ave., Philadelphia, Pa.

HARDWARE-LOCKS—Russell & Erwin Mfg. Co., Mfr., New Britain, Conn.

HOLLOW METAL FIRE WINDOW FRAMES—Panzer-Hamilton Co., Mfr., 137-39 Rose St., Los Angeles, Cal.

HOLLOW METAL FIRE WINDOW FRAMES—Ruda, Louis A., Mfr., 2306-2310 S. Kedzie Ave., Chicago, Ill.

HOLLOW METAL FIRE WINDOW FRAMES—Reed & Co., Geo. W. Ltd., Mfr., 37 St. Antoine St., Montreal, P. Q.

HOLLOW METAL FIRE WINDOW FRAME—Campbell Architectural Iron Co., Inc., Mfr., 8 W. 40th St., New York, N. Y.

LIGHTNING RODS—Miller Lightning Rod Co., Mfr., S. W. Cor. 3rd St., and Geyer Ave., St. Louis, Mo.

LIGHTNING RODS—Burkett Lightning Rod Co., Mfr., Fremont, Ohio.

LIQUID, FIRE RETARDING PAINT—Pyrolin Co., Submitter, Fort Dodge, Ia.

PANELBOARDS—Square D Co., Mfr., Detroit, Mich.

PANELBOARDS—Trumbull Electric Mfg. Co., Mfr., Plainville, Conn.

PENDANT SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

RECEPTACLES FOR ATTACHMENT PLUG AND PLUGS—Square D Co., Mfr., Detroit, Mich.

ALARM VALVE "VENTURI" MODEL 3-D.—Ohio Automatic Sprinkler Co., Mfr., Youngstown, Ohio.

CABINETS AND CUTOUT BOXES—SHEET METAL—Square D Co., Mfr., Detroit, Mich.

CARTRIDGE FUSES—Metropolitan Electric Co., Mfr., Blvd. and 14th St., L. I. City, New York.

CHEMICAL EXTINGUISHER—1 QT., PUMP TYPE—Fire Gun Mfg. Co., Mfr., 17 Battery Place, New York, N. Y.

CLASS A BUILT-UP ROOF COVERINGS—Sifo Products Co., Mfr., 1120 W. 7th St., St. Paul, Minn.

CLASS A BUILT-UP ROOF COVERINGS—Chatfield Mfg. Co., Mfr., 740 Lebanon St., Cincinnati, Ohio.

CURRENT TAPS—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

ENCLOSED SWITCHES—Palmer Electric & Mfg. Co., The, Mfr., 60 K St., Boston, Mass.

ENCLOSED SWITCH—Wadsworth Electric Mfg. Co., Mfr., 405 Madison Ave., Covington, Ky.

ENCLOSED SWITCHES—Globe Electric Works, Mfr., 1959 Mission St., San Francisco, Cal.

ENCLOSED SWITCHES—Detroit Fuse & Mfg. Co., Mfr., Walker Power Bldg., Walkerville, Ont.

ENCLOSED SWITCHES—Detroit Fuse & Mfg. Co., Mfr., Detroit, Mich.

ENCLOSED SWITCHES—Crouse-Hinds Co., The, Mfr., Syracuse, N. Y.

ENCLOSED SWITCH—Wells-Morris Mfg. Co., Mfr., 90 Second St., San Francisco, Cal.

ENCLOSED SWITCHES—Square D. Co. Mfr., Detroit, Mich.

SOLID SECTION METAL FIRE WINDOW FRAMES—American Steel Window Co., Mfr., Chicago Heights, Ill.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR—Thorp Fire Proof Door Co., Mfr. Minneapolis, Minn.

SWINGING, SHEET METAL, VERTICAL COMMUNICATION DOOR—"White Steel" Sanitary Furniture Co., Mfr., Grand Rapids, Mich.

SHEET METAL FIRE WINDOW MULLIONS. Pomeroy Co., S. H., Mfr., 282-296 E. 134th St., New York, N. Y

SHEET METAL FIRE WINDOW MULLIONS. Rysdon Co., Louis S., Mfr., 3319 Wallace Ave., Chicago, Ill.

SHEET METAL FIRE WINDOW MULLIONS. Sykes Co., Mfr., 930 W. 19th Place, Chicago, Ill.

SHEET METAL FIRE WINDOW MULLIONS. Voigtmann & Co., Mfr., 459 W. Erie St., Chicago, Ill.

SHEET METAL FIRE WINDOW MULLIONS. Wagner's Sons Co., J. F., Mfr., 1145-49 Seventh St., Louisville, Ky.

SHEET METAL FIRE WINDOW MULLIONS. Weis Mfg. Co., Henry, Mfr., Kansas City, Mo.

SHEET METAL FIRE WINDOW MULLIONS. Willis Mfg. Co., Mfr., Galesburg, Ill.

WASTE CAN. Lock-Tite Mfg. Co., Inc., The, Mfr., Battle Creek, Mich.

WINDOW CLEANERS' BELTS AND FITTINGS. Royal Safety Anchor Co., Mfr., 62-64 W. Washington St., Chicago, Ill.

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SAFETY ENGINEERING

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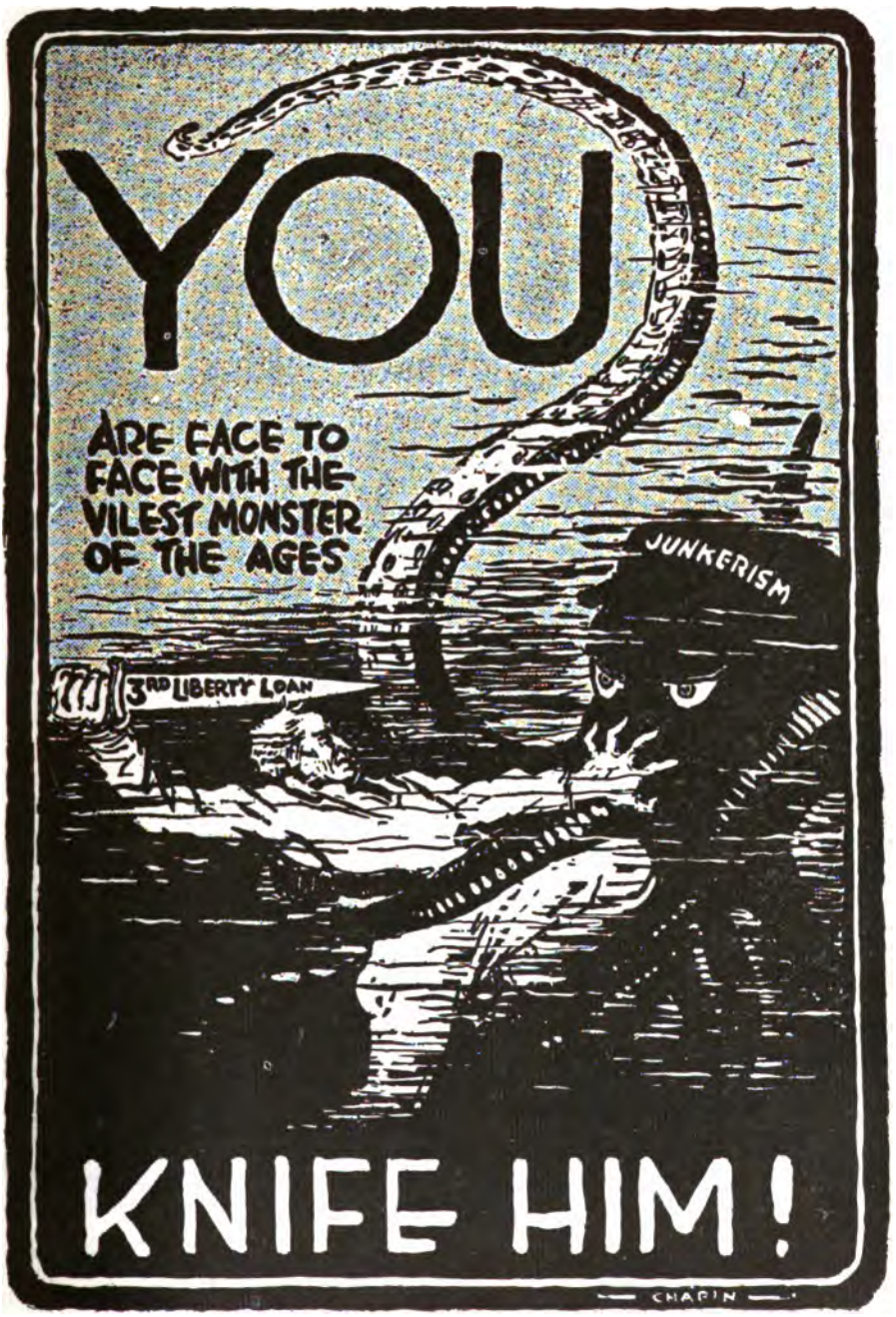

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The Cigarette Fire in Jersey City, N. J., March 26. How It Looked from the New York Side

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A Cigarette in a Warehouse

THE lives of many workmen and workwomen are imperilled (and numerous lives are lost) every year in manufacturing plants and other places of industry, by the "smoking habits" of employes. The cigarette particularly is culpable; it has a long list of casualties to its discredit.

During the afternoon of March 26, Jacob E. Altman, a weigher, pursuing his vocation in the 5-story warehouse of the Jarvis Warehouse Company, Inc., Jersey City, smoked a cigarette. Sparks dropped into a heap of chlorate of potash. A disastrous fire resulted, accompanied with heavy explosions, which wrecked the warehouse, the machine shops of the Erie Railroad, other railroad property and considerable adjoining property.

One of the most expensive smokes any man has indulged in was Altman's cigarette on the afternoon of March 26.

Employes who ignore factory rules and violate city ordinances by smoking during their hours of work deserve to be "shot at sunrise."

A feature of the fire prevention parade in New York City recently was a $444,000 cigarette, which represented the value of property destroyed in New York in one year, traceable directly to the carelessness of smokers.

"Reduced to a daily ratio," *The Insurance Press* remarked, "this fire loss was at the rate of a dollar a minute! Apparently large employers of labor, and even owners of small concerns, are co-operating in varying degrees of heartiness with the fire and police departments to regulate smoking, but somehow the familiar sign, 'No Smoking,' produces about the same effect on the average man as its equally unobserved mate, 'Keep Off The Grass.' Employes do not recognize this injunction as the voice of law. They regard it as merely a curtailment of their rights by a crusty employer who is looking out for his own interests."

The National Board of Fire Underwriters is authority for the statement that, in 1916, smokers caused the destruction of $8,588,375 of property in the United States; to which must be added a list of killed and injured. The National Board figures, by States:

DISTRIBUTION OF FIRE LOSSES CAUSED BY "SMOKING (CIGARS, CIGARETTES, PIPES, ETC.,)" IN 1916.

State.	Loss.
New York	$1,374,615
Massachusetts	739,719
Illinois	628,029
Pennsylvania	621,681
California	551,265
New Jersey	453,406
Minnesota	320,624
Ohio	265,971
District of Columbia	242,605
Connecticut	219,953
Texas	196,379
Delaware	187,631
Michigan	183,716
Florida	172,605
Iowa	125,648
Maryland	124,920
Georgia	119,154
Wisconsin	114,975
Virginia	113,884
Missouri	110,939
North Dakota	110,924
Maine	110,574
Tennessee	103,220
South Carolina	98,740
Kentucky	94,958
Alabama	92,357
Kansas	90,486
Nebraska	83,612
Indiana	83,001
Colorado	82,703
Oregon	82,488
Washington	81,374
Oklahoma	69,520
Rhode Island	68,298
Louisiana	67,947
New Hampshire	66,007
Montana	59,652
Mississippi	47,683
North Carolina	38,225
South Dakota	31,850
Idaho	29,615
Arkansas	25,547
Arizona	23,674
Nevada	20,719
Utah	18,117
Vermont	12,779
New Mexico	9,761
West Virginia	8,703
Wyoming	8,122
Total	$8,588,375

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Photo by Social Press Assn., N. Y.

Top—Ruins of the Jarvis Warehouse, Where the Cigarette Fire Started. Bottom—Ruins of the Erie Railroad Shops

(See preceding page)

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The Menace of Slipping

THE prevalence of the slipping and tripping hazard is now recognized as the cause of a wide range of accidents.

Falling down stairs is not always one's own fault. The stairs he trusts may have treacherous treads. He cannot escape a fall that may break his bones, cripple him for life or cause his death.

Progress, in the last year or two, in seeking the true cause of accidents, and the compilation of more accurate accident statistics, have revealed the fact that slipping is directly responsible for a very large number of casualties, hitherto attributed to some secondary cause.

For instance, a man with arms laden may have slipped and, therefore, come in contact with moving machinery which inflicts a serious injury. While the machine caused the injury, the primary cause of the accident was not the machine but the slipping which brought the man into contact with the machine. Slipping was the cause, for if the man had not slipped, he would not have been injured.

Figures based upon national statistical reports disclose that one-fifth of all accidental casualties are attributable primarily to falls, and one-third of all falls occur on stairs and floor levels. The slogan, "Watch Your Step," is becoming more and more general and significant—it is the national protest against the continuance of the slipping and tripping menace.

So, in order to reduce the number of accidents from slipping, we must not, in all cases, consider the carelessness of the victim to have been the cause of the accident. The condition of stairs, passageways and floors should receive unremitting attention.

To meet the public and industrial demands for the prevention of slipping casualties, safety treads have been developed that are now extensively used. There are several types of safety treads, some of which, experience has demonstrated, possess disadvantages that reduce their effectiveness as preventers of slipping. The

Fig. 1.

Fig. 2.

Fig. 3

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Fig. 4

On the sixth or seventh step from the bottom of this stairway, a woman caught her heel and was pitched forward so that, without striking the stairs, she landed on the floor about 6 feet from the base of the stairs. She was awarded $1,500 damages by the trial court and the judgment was affirmed on appeal (Keiser vs. Milwaukee Boston Store and Herzfield-Phillipson Company). On this stairway, the treads had grooves parallel to the nosing edge. Treads of that type have caused many accidents.

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Fig. 5

most essential requirement of a safety tread is that it shall offer a firm foothold to the shoe of the pedestrian, and that it shall not offer any smooth polished surface.

On the public sidewalks, especially in the larger cities, innumerable examples exist of polished steel plates, polished glass, and metal surfaces which, when moist from rain, sleet or snow, are dangerous hazards to the walking public. Such conditions should not be permitted to exist. It is the duty of the proper department of every city government to insist that they be remedied at once.

Checkered steel plate is known as

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Fig. 6

"Neverslip Flooring." In time the checkered steel plate is worn smooth and polished. Then it is no longer a checkered steel plate; it is a dangerous hazard on the sidewalk. Proper inspection of sidewalks will readily reveal the dangerous conditions that are a hazard every hour of the day and night to the citizens.

Another type of steel tread, having a diamond rolled surface, may possess a certain amount of efficiency before it becomes worn and polished, but the trouble is the treads are permitted to remain long after their efficiency has gone as slipping preventers. Then they work overtime in creating slipping accidents.

Treads possessing parallel grooves have been known to cause slipping accidents. There are several varieties of that type of tread, but all of them have the fault of a smooth metal nosing edge, and a series of grooves parallel to that edge. These grooves are of varying widths and depths. When the foot slides forward on the nosing edge, or if a person has slightly overstepped the edge (Figs. 1 and 2), there is a chance for an accident —tripping may take place, and the individual may be thrown forward, down the stairs.

A test was made on the stairs of a large railroad station, and during the test an average of two accidents per day occurred on stairs equipped with grooved treads. After their removal and replacement by a type of tread without grooves parallel to the nosing, and with an anti-slip nosing, there was not a single reported fall in the following three months.

The safety tread illustrated herewith (Fig. 3) possesses no parallel grooves. It is furnished with a rough metal nosing edge, and offers a rough, unpolished surface, which assures a safe foothold. This tread possesses a remarkable wearing quality and is effective as a slipping preventer for long periods of time, the length of time depending upon the traffic that passes over it. The construction of this tread is preferable to grooved treads, for it meets the fundamental demand of a safety tread, namely, *an unpolished, ungrooved, rough surface.*

That a tread with grooves parallel to the nosing edge can cause slipping acci-

Fig. 7

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dents is proven by the court records of a case where judgment to the extent of $1,500 was awarded to a woman seriously injured through catching her heel on a parallel-grooved type of stair tread. This award was affirmed by the Supreme Court of the State. Property owners, safety engineers and others interested in the prevention of accidents should note this case because it is of recent occurrence, and will, in all probability, be referred to in future accidents of a similar nature.

KEISER VS. MILWAUKEE BOSTON STORE AND HERZFIELD-PHILLIPSON COMPANY

The photograph of the stairway on which the accident occurred is shown herewith (Fig. 4). On the sixth or seventh step from the bottom a woman caught her heel and pitched forward so that, without striking the stairs, she landed on the floor about six feet from the base of the stairs.

It should be noted that the treads on the sixth or seventh step are not placed on top of the wooden sub-tread, but are in a recess, cut out of the wood, so that there was no possibility of the woman's heel catching on the back edge of the tread. There was no offset, as would have been the case if the tread had been placed on top of the wooden tread.

At the trial the victim was a witness in her own behalf. Following is a brief extract from her testimony:

"Q. You do not ascribe your fall to the steepness and narrowness of the stairs?

"A. No, sir.

"Q. Catching your heel was what did it?

"A. Yes, sir."

Another objection to the parallel-grooved tread is that in descending a stairway, equipped with such treads, there is a chance of not being able to clearly distinguish which one of the lines, all running in the same direction, is the line of the step edge. In a poor light, or if a person's eyesight is impaired, this danger is increased (Fig. 5). Grooves parallel to the step edge are dangerous, even in bright sunlight, as is shown in Fig. 6.

Fig. 7 shows a dangerous condition, due to the steel base plate of the tread on the second stair having deteriorated through corrosion. A stair in that condition offers an excellent opportunity for a person's heel to be caught and so cause an accident.

Experience has demonstrated that thin steel plates deteriorate through corrosion. A rusting through at the thin steel plates causes the parts to curl up and so form a hazard. For that reason a tread constructed with thin steel plates should not be used in exposed situations.

The effectiveness of the various types of safety treads is receiving more and more attention, as the subject of slipping accidents is being more carefully studied. The importance of the design and construction of the safety tread is now recognized as an important factor in the prevention of slipping accidents.

The American Railway Engineers' Association, at a recent convention in session at Chicago, through its building committee, reported the following regulations of the Pennsylvania Railroad for stairways used by the traveling public: "No corrugated or ribbed tread over 1/16 of an inch in depth shall be used on any stair. Non-corrugated anti-slip tread of lead and alundum or carborundum; iron and alundum, or carborundum; or concrete and alundum and carborundum are recommended for a width of not less than 8 inches, all treads including nosing."

In considering how best to prevent slipping accidents it would appear that the safety tread itself is the most important feature. To serve the interest of safety, and also for reasons of economy, safety treads should possess not only a rough, slip-proof surface, without polished surfaces, but, in addition, they should be constructed of material of extreme durability that is unaffected by heat or corrosion.

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Plant Sanitary Equipment

By W. N. Fitch

Director of Safety and Hygiene, The B. F. Goodrich Company, Akron, Ohio.

Proceedings of the Engineering Society of Cleveland

THE greatest single leak in industry is the shifting of masses of employes from one place to another, and during the last decade leaders of industry have been seeking to find a cause and eradicate it.

Investigation of the results accomplished by the safety movement demonstrates that there can be no stability of labor unless working conditions are sanitary, agreeable and safe.

In order that laborers can go about their work in a contented manner, the physical surroundings must not only be safe, but must also be healthful.

Plant sanitary equipment is a part of these physical surroundings and plays an important part not only in the happiness of the employe but also in the happiness and health of his family and the community.

In every industry you will find some employes so loyal and interested in their work that they make it a point to leave their homes or rooming places in sufficient time, so as to be on the job at the appointed time.

Here enters the importance of a sufficient shelter, properly warmed and ventilated, provided with seats, where employes can wait and rest comfortably until such time as the doors of the industry open for them to pass in to their regular duties.

LOCKERS

Upon entering the mill, the employe's next important need in the shape of sanitary equipment is a place to dispose of his or her outer garments. It is my experience that the individual locker system is more satisfactory to the employes, thus giving them a clean, safe place to deposit their outer garments and even making it possible for them to make a complete change, and by using a sensible locking system they are able to control the safety of their property. Of course, it is up to the employes to keep their lockers in a clean condition. However, a system of inspection should be provided to prevent the housing of unnecessaries in lockers.

Lockers should be of metal, substantially constructed, connected in units to the best advantage of the space available. Great care should be taken in selecting the type of locker. It should be of sufficient depth to allow the use of a coat hanger, in order that the garments of the employe may be spread out, for on some occasions they will be damp as result of rain, and by spreading them out they will dry much quicker and have a more presentable appearance.

The width of lockers should be sufficient to allow the hanging up of the hat, and any other garments, if the employe should desire to make a complete change.

The height should be sufficient to take care of the average length coat. About 54 inches is a generous provision.

The top should be slanting to eliminate the collection of dust and catch-all for various types of material which might fall off and injure the employes, and adds to the orderly appearance.

The bottom of the locker should set up not less than 8 inches from the floor for ventilation and cleaning, with an opening in the bottom to allow the possibilities of attaching a ventilating system.

One of the important points is the selection of the latch and lock. The latch should be a type which is operated by the handle pulling outward or upward; no matter how great the strain you put upon it, the door comes open.

The type of lock should be that which locks in some way the latch, along the padlock order rather than cabinet type.

It may be of interest for you to know that, as a result of our investigations, we have adopted a locker unit as follows:

Five lockers collected in a unit, setting upon a base of 4 legs, 8 inches from

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the floor, with a height of the front of the locker from the base to the top 5 feet. Height of the back, 5 feet 6 inches; width, 10 inches, and the depth 18 inches, with a shelf within the same 54 inches from the floor, extending 9 inches from the back. There is a groove in the shelf, on which the coat hanger can be hung. There are two hooks on the opposite side from groove. In the bottom and 2 inches from the back end is a 2-inch hole, the edges of which are turned down, for ventilating purposes. Over this opening is a slanting cover, the back of which is 5 inches from the floor, louvred so as to allow the passage of air. This was installed to protect garments from covering up the ventilator in the bottom, or from any material falling into opening, thereby preventing proper ventilation.

On all lockers the latch is of the type described previously, fastened with a combination padlock. We have found that the employes appreciate a locker with the combination padlock, and are very particular about keeping their garments locked up. There is an insert at the top of the locker door for the placing of the name or check number of the employe.

As to the distribution of lockers in offices or factories, I believe the ideal condition is to have locker rooms connected with both lavatory and shower bath rooms, the latter two conveniences to be equipped with a good quality of fixtures to enable the employes to cleanse themselves with running water, and to this add good liquid soap, together with either or both linen and paper towels, and all conveniences to be placed at or near the entrance of the building. In case such installation is made in some old buildings, conditions may exist to cause such equipment to be placed at such point in these buildings other than the entrance thereto, consistent with the object in view; that is, provide a safe and clean place for the clothing of the employes and a sanitary method of keeping their bodies clean. Under such conditions employes take more pride in their personal appearance, their surroundings and their employment, all of which means success to the employe and to the employer.

LAVATORIES

I will briefly describe the method and the equipment of lavatories now in use at The B. F. Goodrich Works, at Akron, O.

The lavatories consist of 8 ft. units of white enamel steelware equipped with 5 goosenecks provided with spray-heads about 2 inches in diameter, located 20 inches from bottom of lavatory, through which water mixed with steam (for the purpose of warming) flows with some pressure, also between each gooseneck a liquid soap dispenser, tilting style, is attached, filled with a good quality of liquid soap. The lavatory units have no stopper at waste opening, in order to assure each user that he may wash in clean running water which has not been used, nor can be used, by any one else.

In addition to the above, lavatories are furnished with a good quality of paper towels, with the ordinary paper towel holder, and in some cases small individual linen towels.

SHOWER BATHS

Shower baths are also equipped with shower heads much larger than those on lavatories, each shower contained in an enclosure for the purpose of privacy, and thorough floor drainage, the floor having a wooden grating as an additional convenience to the employes. Shower baths are furnished with low white enameled stools, liquid soap dispensers and bath towels of generous size, and all contained in well lighted and well ventilated rooms free from draught, in order to prevent colds and to add to the comfort of the users.

DRINKING WATER

The all important part of drinking water is its purity. Of course, water must possess other qualities than purity. It must be of a pleasing temperature, as well as attractively clear, and the method of distribution to factory employes must also be considered.

I have in mind one system that is giving satisfaction, composed of an automatically cooled circulating system with founts set at places convenient to the employes. These founts are provided with a spring operated valve. When the spring is compressed, several streams

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flow from the inside of a ring toward the center. These streams, upon uniting, form a stream of such quantity as to satisfy the ordinary employes, and quenches their thirst with fine, wholesome water with a pleasing, palatable temperature.

Drinking water should be tested for its impurities daily by competent chemists.

The founts above described are thoroughly washed daily and therefore present an inviting appearance at all times.

In some of the older plants there is still in existence the crude method of serving water to employes, such as the use of Bristol-ware jars, etc. In such cases water of the proper quality and temperature may be served in a reasonably safe manner, if jar is provided with a faucet and the individual cup used, whether this cup is of metal or paper; however, extra care must be exercised in this method to prevent the improvident from using another's drinking vessel.

The filling of these jars can be done quite safely, if the water is furnished from a tank on wheels, the tank being equipped with a pump. This prevents any person handling a pail, and is less likely to catch any flying particles that may be in the atmosphere. I believe that this latter method should be discontinued as soon as the automatic bubbler system can be installed. It is necessary that the jars be washed out thoroughly every day.

The foregoing contains only some of my experiences, and for further information you are referred to the United States Public Health Service Bulletin, Vol. 32, issued May 11, 1917.

CUSPIDORS

Cuspidors are used in many offices and factory rooms to prevent expectorating on the floors and other places, such spitting being caused by various conditions, the main one, however, being the result of the visible vice known as tobacco chewing.

The proper cleansing of cuspidors is one of our troubles, because the work itself is not desirable, and again a real efficient method or machine has not come to our attention. From the engineering profession a method has been adopted at the Goodrich factory, a description of which follows:

Collection and Distribution.—A rectangular metal box is used for both collection and distribution, equipped with a cover in four parts (this prevents exposing the contents of carriers to those not in sympathy with the tobacco habit), placed on a 4-wheel truck and demountable in order that load, box included, may be promptly removed from truck and a load of clean cuspidors started on its tour of distribution and collection.

Cleaning.—Cuspidors are emptied into a digestor composed of a ¼-inch screen receptacle placed over a sewer opening, all of which is surrounded by a metal cylinder with foot operated cover. When the solid matter has filled the screen receptacle it is removed from the cylindrical envelope and an empty clean one replaces it, the full screen being emptied into a garbage can and covered ready for final disposition at the incinerator.

The cuspidors after being emptied at digestor are passed to a bench provided with racks properly equipped with pegs on which to set the bowl and covers of cuspidors. These racks are then placed in a machine having a capacity of 4 racks. This machine is provided with warm water into which has been placed a washing solution, the water being pumped onto contents through rapidly revolving sprays at considerable force. When this washing is done, which requires about 1½ minutes, the pump is stopped and a douche of steam and hot water is thrown on cuspidors, thereby rinsing them of the washing solution, and which not only thoroughly cleans and disinfects, but also heats the metal of which cuspidors are made, and also dries them upon removing same from the machine. The cuspidors are then removed from the trays and placed in the rectangular box, before mentioned, and are ready again for distribution. Of course, when trays are removed from the machine, four more trays replace them, and so on in multiple. The cuspidors used in the Goodrich factory, about 5,000 in number, are made of galvanized metal, about 9 inches in diameter, with removable top which is concave with a 2-inch opening. All cuspidors are cleaned every day. The method de-

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scribed in the foregoing is the most satisfactory we have seen or heard of.

TOILETS

Our experience has taught us the importance of locating toilets on outside exposure for light and ventilation.

In new construction our toilets are installed in towers built especially for elevators, stairs and toilet rooms, located at the most practical point for the convenience of the occupation carried on in the building.

In selecting our equipment, the engineering and safety and hygiene departments considered the various points as to sanitation and efficiency.

Our standard consists of full length solid porcelain urinals equipped with supply pipes for constantly running water, separated by a screen for privacy.

Solid porcelain closets with open front type of seats, automatically flushed by seat action. Each closet enclosed in a cabinet with door. Inside dimensions of the cabinet 48 inches by 32 inches, door having a minimum height from the floor of 18 inches.

From a sanitary as well as an economical standpoint, we adopted sheet metal cabinets enameled white. The metal is formed in such shape as to leave practically no openings for the accumulation of dirt.

For convenience each toilet room has installed a small or large lavatory, with flow of water arranged so that employes will not be obliged to touch the control with their hands, also equipped with liquid soap, and individual towels of either linen or paper.

Floors are constructed of concrete pitched to a floor drain. Spigots are supplied for the attaching of hose for flushing out the entire unit.

For the sake of cleanliness it is necessary that closets be washed every 24 hours.

CONCLUSIONS

In conclusion let me emphasize the fact that if the employe and employer are to reap the proper benefits, this equipment must go hand in hand with work rooms properly ventilated and lighted and some painting scheme along practical lines, such as a dark green wainscoting, yellow side walls and white ceilings.

All sanitary equipment, as described, means nothing unless you are continuously on the outook for something to benefit and maintain it.

We are all human, and take more or less commendable pride in looking and feeling well dressed and clean. Cleanliness is truly next to godliness, for, within reasonable limits, the better dressed and cleaner an employe is the greater asset he is to a business. The plant, then, which has the best conveniences will attract and hold the pick of workmen; for there is not a workman worth while who would not prefer employment in a place where he can wear a good suit of clothes to work, change when he gets there, don a suit of working clothes which have been drying and airing over night, then when he quits for the day shed his working clothes, bathe, wash, don his street attire and step off like a new man, than work in a dingy, smoky place where there are no bathing conveniences, and he must go to and from work with the dirt and grime of his occupation on person and clothes.

This sort of thing

will land you in a hospital sooner or later.

Don't Board a Moving Car!

Columbus Railway, Power & Light Company.

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Safety Standards for Cranes

By the Industrial Board of the Pennsylvania Department of Labor and Industry

Operative on and after March 1, 1918.

THE following Standards apply to cranes, which are regularly used in and form part of a permanent industrial plant. In addition to Electric Traveling Cranes, the regulations are to cover Gib Cranes, Mono Rail Cranes, Hand Power Cranes, and other hoisting apparatus of a similar nature, in so far as the various sections apply.

ELECTRIC TRAVELING CRANES

STRENGTH.

1. All apparatus shall hereafter be designed throughout with not less than the following factors of safety, under static full rated load stresses, based on the ultimate strength of the material used: (a) All gears, and complete hoisting mechanism, factor of not less than 8. (b) All other parts, factor of not less than 5.

2. Calculations for wind pressure on outside cranes shall be based on not less than 30 pounds per square foot of exposed surface.

3. A notice showing the maximum allowable load in pounds for each hoist shall be placed on each crane girder in such a manner as to be clearly legible from the floor.

GENERAL CONSTRUCTION.

4. Cranes should be of what is known as "All Steel Construction." No cast iron should be used except for such parts as drums, bearings, brackets, etc. No combustible material should be used. All bolts should be of the through type, and be equipped with approved protection so that the bolt will not work loose or nuts work off.

5. The construction of the crane shall be such that all parts may be safely lubricated when the crane is not in operation.

6. Heavy safety lugs or brackets shall be placed on trolley frames and bridge end carriages, to limit drop to 1 inch or less if a wheel or axle should break.

PLATFORMS AND CLEARANCES.

7. Platforms should be provided for changing and repairing truck wheels on end trucks and provided with stairways leading to them.

8. A platform or footwalk shall be located at or near the crane runway to give access to the crane, and it shall be accessible from one or more stairways or fixed ladders. This platform or footwalk shall be not less than 20 inches in width.

9. A footwalk shall be placed along the entire length of the bridge on the motor side, except when the construction of the crane prevents, or when such platform would not ordinarily be used for the repair or maintenance of the crane. In future installations of footwalks, the clearance shall be at least 6 feet 6 inches below the bottom of the overhead trusses. Clear width of this footwalk shall be not less than 18 inches, but it may be reduced to 15 inches around the bridge motor.

10. Footwalks should be placed across the ends of the trolleys at right angles to the bridge walks, and shall be not less than 12 inches in width.

11. Footwalks shall be of substantial construction, and rigidly braced.

12. On crane footwalks hereafter erected, no openings shall be permitted between the bridge footwalks and the crane girder. When wire mesh is used to fill this opening the mesh openings shall not be greater than one-half inch.

13. Each footwalk shall have a standard metal railing and toe board at all the exposed edges wherever practicable.

14. Not less than 12 inches actual clearance should be allowed between

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highest point of the crane and the overhead trusses, and not less than 2 inches between any part of the crane and building, column, or other stationary structure. Where more than two crane runways are parallel there should be a clearance of not less than 24 inches between the extremities of the cranes.

CAGE.

15. Means of escape shall be provided for operators of hot metal cranes. This shall consist of a walkway accessible from the crane cage in all its positions, or of some other approved arrangement.

16. The operator's cage shall be located at a place from which signals can be clearly distinguished and shall be securely fastened in place and well braced, to minimize vibration. It shall be large enough to allow ample room for the control equipment and the operator. The operator shall not be required to step over an open space of more than 18 inches when entering or leaving the crane or cage.

17. A pail filled with sand or an approved fire extinguisher shall be carried in the crane cage for use in case of fire.

18. An approved foot or hand operated gong or other effective warning signal shall be placed in a location convenient to the operator and shall be securely fastened.

19. Ladle and other cranes subjected to heat from below should have a steel plate shield not less than one-eighth inch thick and placed not less than 6 inches below the bottom of the floor of the cage.

20. The cages of cranes hereafter erected shall be of non-combustible construction.

21. A metal tool box or receptacle shall be permanently secured in the cage or on the runway for the storing of oil cans, tools, etc.

GEARS AND KEYS.

22. All gears on cranes hereafter erected shall be provided with standard guards. This shall apply to all existing cranes where practicable.

23. No overhung gears shall be used unless provided with an effective means of keeping them in place, and keys shall be secured in an approved manner to prevent gears working loose.

24. Keys projecting from revolving shafts shall be guarded.

ELECTRICAL EQUIPMENT.

25. The installation of the switchboard, wiring, and all electrical equipment must fully comply with the Industrial Board Standards. (See Prgs. 380, 381, 382, 383 Electric Code, printed herewith.)

26. Open-type controllers shall have an asbestos lined steel guard over the movable contact parts, both to protect the operator's eyes and to prevent articles from falling on contact parts.

27. An approved hoist limiting device shall be provided for each hoist.

BRAKES.

28. Suitable brakes shall be provided for the hoist and bridge travel. Each hoist shall be equipped with effective brakes which shall be capable of sustaining at least 1½ times the full rated load.

TROLLEY.

29. The drums on cranes hereafter erected shall have a flange at each end to prevent the ropes from getting off the drum, and shall be so designed that there will be not less than two full wraps of hoisting cable in the grooves when the hook is at its lowest position.

30. The hook block shall be of a type so arranged that it will lift vertically without twisting.

31. Bottom sheaves shall be protected by close fitting guards, to prevent the rope from becoming misplaced.

32. Cables should be used in preference to chains wherever practicable.

33. The trolley should be completely floored.

BUMPERS AND FENDERS.

34. Bumpers shall be provided at both ends of the crane runway and at

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ends of the crane bridge. Bumpers shall extend as high as the centers of the wheels. They should be fastened to the girders and not to the rails. This does not apply to portable rail stops. When two or more cranes are placed on the same runway, or when two trolleys operate on the same bridge rails, bumpers shall be provided to prevent collisions of the cranes or trolleys. Bumpers shall be built up of plates and angles, or be made of cast steel, or be of other approved types.

35. Fenders shall be installed which extend below the lowest point of the treads of the wheels and project in front of all track wheels. They shall be of a shape and form that will tend to push and raise a man's hand, arm, or leg off the rail and away from the wheel.

CRANES FOR OUTSIDE SERVICE.

36. Cranes in outside service shall have the following additional provisions: (a) Floors or footwalks shall be constructed so as to provide proper drainage. (b) The cage shall be enclosed and of fire resisting construction; there shall be windows on three sides of the cage, and windows in the front and the side opposite the door shall be the full width of the cage. (c) The floor of the cage on outdoor cranes should be extended to an entrance landing which shall be equipped with a handrail and toe board of standard construction. (d) Where there are no members over the crane suitable for attaching blocks for repair work, a structural steel outrigger of sufficient strength to lift the heaviest part of the trolley should be arranged on the crane. (e) There shall be an approved lock so that the cranes may be prevented from being blown along or off the tracks by a severe wind, at any time.

GANTRY CRANES.

37. Gantry cranes should be equipped with automatic signals to warn of movement along the track.

38. The truck wheels of Gantry cranes shall be provided with guards or fenders.

PENNSYLVANIA ELECTRIC CODE

The paragraph numbers coincide with those of the Electric Code, Industrial Board Safety Standards, Vol. 1, No. 21.

ELECTRICALLY OPERATED CRANES.

Definitions of Special Terms.—The following definitions give the meanings of some of the terms occurring in these rules. The terms not defined will be understood to have their usual meanings.

3. *Electrical Supply Lines* means those conductors and their necessary supporting or containing structures which are located entirely outside of buildings and are used for transmitting a supply of electrical energy. Does not include open wiring on buildings in yards or similar locations where spans are less than 20 ft., and all the precautions required for stations or utilization equipment, as the case may be, are observed. Railway signal lines above 400 volts to ground are always supply lines within the meaning of these rules, and below 400 volts may be considered as supply lines, if so run and operated throughout.

7. *Circuit* means a conductor or system of conductors through which an electric current is designed to flow, and connected equipment.

8. *Grounded* means connected to earth or to some extended conducting body which serves instead of the earth, whether the connection is intentional or accidental.

9. *Grounded System* means a system having a permanent and effective electrical connection to earth. This ground connection may be at one or more points. "Effective" as herein used means a connection to earth of sufficiently low resistance and high current-carrying capacity to prevent any current in the ground wire from causing a harmful voltage to exist between the grounded conductors and neighboring exposed conducting surface which are in good contact with the earth, or with neighboring surfaces of the earth itself, under the most severe conditions which are liable to arise in practice.

10. *Permanently Grounded* means such an effective connection to the earth (by use of an underground system of metallic pipe mains or other suitable means) as described in the preceding paragraph.

11. *Current-Carrying Parts* means a part intended to be connected in an electric circuit to a source of voltage. Non-current-carrying parts are those not intended to be so connected.

15. *Automatic* means self-starting, operating by its own mechanism when actuated by some impersonal influence; as, for example, a change in current strength. Not manual, without personal intervention. Remote control that requires personal intervention is not automatic, but manual.

17. *Switch* means a device opening or closing or changing the connection of a circuit

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manually. In these rules a switch will always be understood to be manually operated, unless otherwise stated.

20. *Qualified or Authorized* means properly qualified or authorized to perform specified duties under the conditions existing. Responsibility for the authorization and decision as to the qualifications of employes rests with the employer or his agent.

21. *Guarded* means covered, shielded, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens, mats, or platforms, to remove the liability of dangerous contact or approach by persons or objects to a point of danger.

22. *Isolated* means that an object is not readily accessible to persons unless special means for access are used.

24. *Exposed* means that an object or device can be inadvertently touched or approached nearer than a safe distance by any person. Objects not suitably guarded or isolated.

26. *Insulating* (where applied to the covering of a conductor or to clothing, guards, rods, and other safety devices) means that a device, when interposed between a person and current-carrying parts, protects the person making use of it against electric shock from the current-carrying parts with which the device is intended to be used; the opposite of conducting.

29. *Conductor* means a metallic conducting material, usually in the form of a wire or cable, suitable for carrying an electric current. Does not include bus bars.

43. *Conduit* means (in underground work) a group of any number of ducts for underground cables.

380. *Guarding Live and Moving Parts:*

(a) All current-carrying parts connected to circuits above 150 volts to ground shall be so isolated or guarded that no person can inadvertently come in contact with them.

(b) *Conductors.*—All conductors over 150 volts to ground in locations accessible to the public shall be run in conduit, armoured cable, or molding, the exposed metallic parts of which shall be permanently grounded.

(c) *Equipment.*—Guards for the current-carrying parts of unisolated electrical equipment, such as controllers, motors, transformers, automatic cut-outs, circuit breakers, switches, and other devices, shall consist of cabinets, casings, or shields of permanently grounded metal or of substantial insulating material.

(d) *Arcing or Suddenly Moving Parts.*—All such parts of electrical equipment, including fuses and the handles and arc chutes of circuit breakers, shall be so isolated or guarded that the liability of persons being struck or burned by sparking, flashing or movement during operation is reduced as far as practicable.

381. *Grounding Noncurrent-carrying Parts:*

(a) All exposed noncurrent-carrying metal parts of electrical equipment at over 150 volts to ground shall be permanently grounded. In electric cars all steam or hot-water heating devices accessible to the public shall also be grounded. The ground connection through well-bonded track rails will be considered satisfactory for equipment on cars and cranes.

(b) The metallic parts of portable cranes, derricks, hoists, and similar equipment on which wires, cables, chains, or other conducting objects are maintained should be provided with an effective protective ground, where operated in the vicinity of supply lines operating at over 150 volts to ground, whether the cranes or similar equipment are themselves electrically operated or not.

382. *Control of Energy Supply to Cars and Cranes:*

(a) Readily accessible means shall be provided whereby all conductors and equipment located in or on cars or cranes can be disconnected entirely from the source of energy at a point as near as possible to the trolley or other current collectors.

(b) A circuit breaker or switch, capable of interrupting the circuit under heavy loads, shall be used unless the current collector can be safely removed, under heavy loads, from the trolley or third rail.

(c) Where a car is operated in locations other than private rights of way and equipped with both trolley and third-rail current collectors, means shall be provided by which any exposed third-rail collector can be readily disconnected from the trolley circuit when not in use.

383. *Control of Movement of Cars, Cranes and Elevators:*

(a) Means shall be provided whereby the operator (whether motorman or elevator attendant) can prevent the starting of the equipment by unauthorized persons while he is absent from his post. Removable reverse levers or controller handles and locked doors to the operator's cab are among the most effective means.

(b) The car-control lever of passenger elevators should be located so that the operator can readily face the principal car opening. For cars and traveling cranes the car control should be so located that the operator can readily face the direction of travel.

RULES.

RULES FOR OPERATORS.

1. Cranes shall be operated only by regular crane operators, authorized substitutes who have had at least two weeks' experience and training under the supervision of a competent operator, crane repairmen or inspectors; no one else should enter a crane cage.

2. No person shall operate a crane who cannot speak and read English or who is under 18 years of age.

3. No person shall be permitted to operate a crane whose hearing or eyesight is defective, or who may be suffering from heart disease or similar ailments. A physical examination is required at least once each year.

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HOIST—Make small horizontal circles with the hand, holding the forearm in a vertical position and forefinger extended.

RACK—Jerk hand in direction of racking with arm extended, hand just above hip, fingers closed, thumb extended horizontally.

STOP—Hold position rigidly with arm extended and hand level with hip.

LOWER—Wave forearm downward with arm extended and palm downward, hand below the hip.

TRAVEL—Wave forearm with palm in direction of travel and with forearm vertical.

EMERGENCY STOP—Move hand quickly to right and left with arm extended, hand level with the hip.

From Safety Standards, Industrial Board, Pennsylvania Department of Labor and Industry

STANDARD SIGNALS FOR OPERATION OF CRANES, USING ONE HAND

"The operator shall recognize signals only from the one man who is supervising the lift. Operating signals should follow an approved standard. They should be manual, never verbal. Whistle signals may be used where one crane only is in operation."

4. Hands shall be kept free when going up and down ladders. Articles which are too large to go into pockets or belts should be lifted to or lowered from the crane by hand line. (Excepting where stairways are provided.)

5. Cages shall be kept free of clothing and other personal belongings. Tools, extra fuses, oil cans, waste and other articles necessary in the crane cage shall be stored in a tool box, and not left loose on or about the crane.

6. The operator shall familiarize himself fully with all crane rules and with the crane mechanism and its proper care. If adjustments or repairs are necessary, he shall report the same at once to the proper authority.

7. The operator should not eat, smoke, or read while on duty, or operate the crane when he is physically unfit.

8. The operator or some one specially designated shall properly lubricate all working parts of the crane.

9. Cranes shall be examined for loose parts or defects each day on which they are used.

10. Cranes shall be kept clean.

11. Operators shall avoid as far as possible carrying loads over workmen; this shall be absolutely avoided when carrying molten metal or with magnet.

12. Whenever the operator finds the main or the emergency switch open, he shall not close it, even when starting on regular duty, until he has made sure that no one is on or about the crane, and he shall not oil or repair the crane unless the main switch is locked open.

13. Before closing the main switch, the operator shall make sure that all controllers are in "OFF" position.

14. If the power goes off, the operator shall immediately throw all controllers to "OFF" position until the power is again available.

15. The operator should not reverse a motor until it has come to a full stop, except to avoid accidents.

16. The operator shall pay special

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attention to the block, when long hitches are made, to avoid tripping the limit switch.

17. The operator shall recognize signals only from the one man who is supervising the lift. Operating signals should follow an approved standard; they should be manual, never verbal. Whistle signals may be used where one crane only is in operation.

18. Before starting to hoist, the operator shall place the trolley directly over the load to avoid swinging it when being hoisted. This precaution is especially important when handling molten metal.

19. The operator shall not make side pulls with the crane except when especially instructed by the proper authority.

20. When handling maximum loads, particularly ladles of molten metal, the operator shall test the hoist brakes after the load has been lifted a few inches; if the brakes do not hold, the load should be lowered at once and the brakes adjusted or repaired.

21. Bumping into runway stops or other cranes shall be avoided. When the operator is ordered to engage with or push other cranes, he shall do so with special care for the safety of persons and cranes.

22. When lowering a load, the operator shall proceed carefully and make sure that he has the load under safe control.

23. When leaving the cage, the operator shall throw all controllers to "OFF" position and open the main switch.

24. If the crane is located out-of-doors, the operator shall lock the crane in a secure position to prevent it from being blown along or off the track by a severe wind.

RULES FOR FLOORMEN (CRANE DIRECTORS)

1. Floormen shall give all signals to the operator in accordance with approved standards, preferably manual.

2. Floormen shall be responsible for the condition and use of all hoisting accessories and for all hitches.

3. Before the operator moves a crane upon which an empty chain sling is hanging, the floorman shall hook both ends of the sling to the block.

4. Floormen where necessary should walk ahead of the moving load and warn people to keep clear of it. They shall see that the load is carried high enough to clear all obstructions.

5. Floormen shall notify the foreman in advance when an extra heavy load is to be handled.

6. Floormen shall not ride or allow others to ride on the hook or load.

RULES FOR REPAIRMEN.

1. When repairs are necessary, repairmen should have the crane run to a location where the repair work will least interfere with other cranes and with operations on the floor.

2. Before starting repairs, repairmen shall see that all controllers are thrown to "OFF" position, that main or emergency switches are opened; one of these shall be locked.

3. Repairmen shall immediately place warning signs or "OUT OF ORDER" signs on a crane to be repaired and also on the floor beneath. If other cranes are operated on the same runway, repairmen should also place rail stops at a safe distance or make other provisions that are safe.

4. When repairing runways, repairmen shall place rail stops and warning signs or signals so as to protect both ends of the section to be repaired.

5. Repairmen shall take care to prevent loose parts from falling or being thrown upon the floor beneath.

6. Repairs shall not be considered complete until all guards and safety devices have been put in place and the block and tackle and other loose material have been removed.

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Safety Work on Canadian Government Railways

By J. E. Long

Safety Engineer, Canadian Government Railways

BRIEFLY the results of accident prevention work on the Canadian Government Railways (formerly known as the Intercolonial and Prince Edward Island Railways), for the four years ended December 31, 1917, as compared with four years on the same basis as the year ended December 31, 1913, before the safety committees were organized, have been as follows:

Thirty-eight fewer employes killed, a decrease of 50 per cent.

Five hundred and twenty-two fewer employes injured, a decrease of 19 per cent.

Seven fewer passengers killed, a decrease of 58 per cent.

Ten fewer passengers injured, a decrease of 10 per cent.

Two fewer outsiders (trespassers, etc.) killed, a decrease of 2 per cent.

Thirty more outsiders (trespassers, etc.) injured, an increase of 30 per cent.

Grand total:

Forty-seven fewer all persons killed, a decrease of 26 per cent.

Five hundred and two fewer all persons injured, a decrease of 17 per cent.

The benefits of our "Safety First" work are most apparent when comparison is made between the traffic and accident figures. During the past four years the railways have handled a much greater amount of traffic than for any similar period in their history. Despite that fact the number of deaths and injuries, particularly to employes (and excepting outsiders, trespassers, etc.), have been materially reduced.

From June, 1914, to December, 1917, inclusive, the safety committees have reported the correction of 11,517 unsafe conditions and warned against 5,533 unsafe practices, a total of 17,050 corrections.

COMPARATIVE STATEMENT OF ACCIDENTS FOR YEARS OF 1913, 1914, 1915, 1916, 1917. SAFETY FIRST WORK WAS STARTED JANUARY 1914

	Employes		Passengers		All Others	
	Killed	Injured	Killed	Injured	Killed	Injured
1913	19	695	3	23	23	24
1914	7	538	2	22	22	31
1915	8	445	1	25	20	22
1916	14	571	1	22	28	52
1917	9	704	1	13	20	21

Safety Fire Shutters Efficient

IN commenting on a fire which destroyed part of a picture film in a motion picture theater of the city, a Phœnix (Ariz.) paper praises the efficiency of the safety fire shutters on the projecting machine. A broken end of a film flew into the lamp on the machine, but the shutters worked immediately and confined the fire to the steel magazine. The article said: "The ease with which the fire was handled by the steel container and the fact that not all of the thousand feet of inflammable material was destroyed, shows to what extent modern appliances have minimized fire danger in theatres."

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Reduction in Accidents Means Increased Efficiency

By H. P. Heyne

Safety Inspector, United Alloy Steel Corporation, Canton, Ohio

DID it ever occur to you how interesting and important the safety movement is? Interesting, because it has to do with progress and development of the nation by the conservation of human energy. Important, because of the efficient and satisfactory results which can be accomplished.

By a careful study we can bring about the desired results, through co-operation and team-work, which lead to efficiency and success.

The principal elements in accident prevention are organization; systematic education and the safeguarding of machinery and equipment.

The average person will dodge automobiles and cross tracks without first looking for approaching cars or trains, and thinks he is acting in accordance with safe practices, while at the same time he is flirting with the undertaker and doesn't know it, and likewise is performing his work in a more or less thoughtless or careless manner. He must be made to realize the real meaning of safety by keeping the matter uppermost in his mind.

It might be interesting to add that one of the members of the "Safety First" Association of Chicago, in watching 7,779 people cross a street in Chicago, where so many accidents happen, saw only 78 of the 7,779 look before crossing. This was brought out by Mrs. Minnie Riddle, of the association, who addressed the pupils of the Central High School of Canton last Fall.

Is there reason to wonder why so many persons are killed, maimed and crippled?

A few of our methods to keep safety before our men:

Bulletin board service, displaying broken goggles, illuminated signs, danger tags, portable danger signs, warning signs, safety teams in departments, safety literature, investigating accidents, safety methods and regulations, letters of encouragement to foremen.

TO KEEP THE FOREMEN ACTIVE

For this purpose we render a "Foremen's Safety Efficiency Report" each month covering time-lost accidents, showing names of all foremen, their rating, rank and classification.

The accidents are based on the number of men under their supervision. This scheme has created a great deal of enthusiasm and, keeping the foremen more active in the safety movement, has brought good results.

CAUSES OF ACCIDENTS

By keeping a record of the causes of all "time-lost" and minor injuries, we know which ones show an increase, which gives us a clue to work on, with a view to reducing the increases to a minimum.

	Causes of Injuries	
	Jan.	Feb.
	Per Cent	
Eyes	19.3	17.4
Hand Tools	29.2	14.2
Burns	16.2	11.2
Sprains	4.4	8.0
Objects falling (men dropping things)	16.7	26.2
Puncture Wounds	2.4	5.9
Machinery	2.6	7.2
Transmission	....	.5
Pinched and Squeezed	1.6	4.8
Falls	6.0	3.8
Miscellaneous	1.6	.8
	100.	100.

WEEKLY DEPARTMENTAL ACCIDENT CHART

We maintain a weekly graphic chart, showing the total number of injuries, covering each department and division, which shows us at a glance how one department compares with another. As soon as there is an increase, we immedi-

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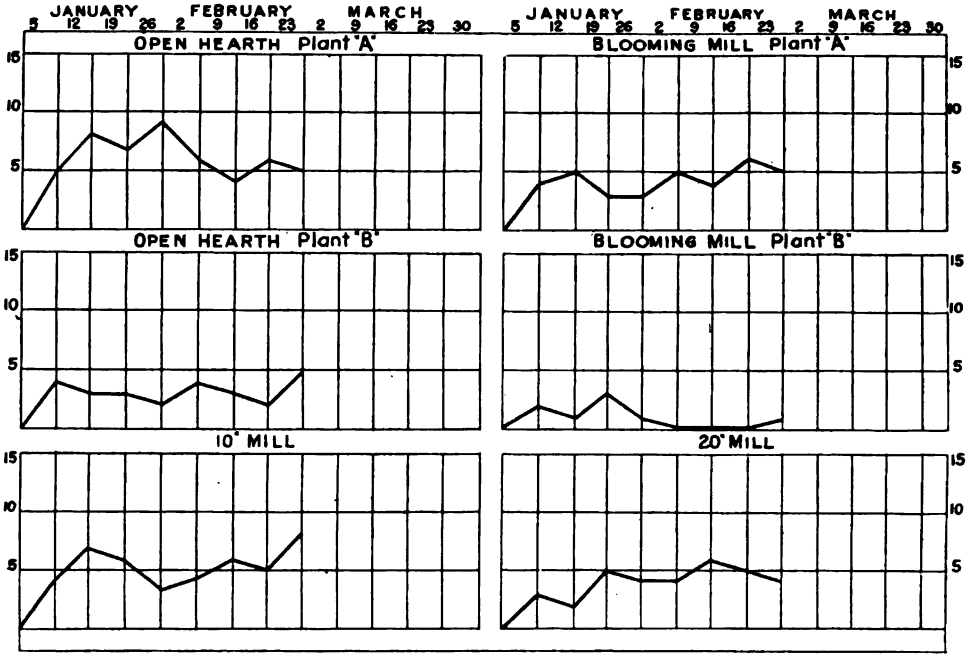
DEPARTMENTAL WEEKLY ACCIDENT CHART—TOTAL TIME LOST AND MINOR INJURIES



ately inform the superintendent and foreman that their department is running high and make an investigation for the correction or removal of the cause.

A daily graphic chart, similar to the weekly department chart, is kept, covering injuries for all departments, whereby we may know each morning whether the plants as a whole are showing an increase or reduction.

The accompanying diagram shows the way we maintain our charts. We have shown but six departments, sufficient to convey the idea.

Safety Work in Navy Yards

TO maintain the interest of leading men, foremen and others in safety work, a short letter is sent to each of them on the first day of the month, by one of the busy navy yards. The April 1 bulletin:

April First!

Some call it All Fools' Day, but for us it is the first day of a new month—one that must see 100 per cent production in output from every shop. That is our war service—our chance to "man the guns."

All of us know what havoc accidents cause; even a slight injury means a reduction of shop output. Hence in our efforts to turn out the maximum production we must not overlook the gain that will come from accident prevention.

These are unusual times for every line of industry. New men constantly coming to work and daily we find new conditions to meet, but if we stick to the job, constantly striving to reduce accidents—the results will be obtained. We are making progress in this yard and you will be interested to know that other yards are making rapid strides, too.

Handling material is the cause of more accidents than any other kind of work. It is also something that every shop has to perform.

During March we had 50 cases in which men lost time from work on account of accidents while handling material. This demands our careful attention and through some special effort along this line we can eliminate a great many accidents.

Put it up to your men definitely. When you see them handling material the careless way—show them the right way. The man with the "dropsy habit" hurts himself and other fellows.

You can't afford to have him handicap your work.

Try to cure him.

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Health Plus Safety Equals Efficiency

By Dr. J. A. Cousins

Medical Director, Union Bag & Paper Corporation, Chicago, Ill.

AT least two of the essential conditions in the construction of a building are that it shall be so designed and equipped as to afford a given number of men and women wholesome and safe surroundings during the performance of their duties and preserve their life and health, aiding them in the most effective performance of their duties and excluding outside influences that are detrimental to these ends. I have reference principally to systems of ventilation, illumination and the placing of proper safeguards.

Where the principles of sanitation have not entered into the design and structure of a building, it is imperative that we exercise every care to minimize or overcome such defects. In many respects the life of an employe is influenced by the circumstances of his surroundings and it is evident that his life is increased in value in direct proportion to the improvement in safety conditions of his immediate environments. It is axiomatic that the health, strength and endurance of an organization can be no greater than that of the individual unit of all its members; consequently every individual either adds to or detracts from the sum of the organization's productivity in direct proportion to his standard of health. An imperfect piece of machinery cannot turn out perfect work—neither can an employe who has neglected his health. Productive efficiency is gauged by physical well-being. The demand for more efficient service and the multiplication of administrative and specialized positions, governmental and industrial, give impetus to health training.

It has become increasingly evident of late that good physical condition on the part of workers is necessary for the progress and stability of the institutions in which they may be employed. Industry is facing the possibility—I might say the certainty—of a demand on the part of employers that the physical condition of those who seek employment be ascertained by medical examination, and that the physical condition of those now employed be adjusted to more properly fit them to carry on their work. This is only what is to be expected under certain circumstances, and is an imperative necessity.

The institutions which have taken the lead in this movement deserve full credit for the initiative and forethought they have displayed. The fallacy has been shattered that only in large and well-developed institutions it was economically possible to provide the various sources of knowledge and assistance necessary for recovery or maintenance of health. It has been proven that much can be accomplished through wise methods of educating employes in health and safety matters, even in quite small plants; but to secure maximum effect the work must be co-ordinated in the plant and in the homes. Efforts in this direction, however, must be attempted very tactfully and the methods used will necessarily vary to meet the intelligence and spirit of the employes. Community education by means of lectures, talks, the bulletins of the National Safety Council, moving-pictures and many other activities, has been quite successful when placed in the hands of experienced surgeons and safety engineers.

In industrial institutions, as well as in social activities, leadership is necessary in developing a general outline of the system to be followed in matters pertaining to standards of health, and such safety plans as have been adopted are gradually being improved and more nicely adjusted to actual needs. The medical department of the up-to-date company strives to perfect its organization and surround the employes of its plant with most favorable conditions.

Unity of organization, proper teamwork, and efficiency can be secured only

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as each individual realizes the importance of his personal responsibility in maintaining his health and protecting the rights of others. Close and sympathetic cooperation between employer and employe in matters pertaining to health is of fundamental importance, since only under such conditions can an industrial organization gain the requisite efficiency.

The foreman is an important link between the employer and the employe. His close relationship with the employer and his constant intercourse with the workmen give him an opportunity to exercise that knowledge of human nature which is essential to firm and tactful control of individuals as well as of groups. His influence will also have a special bearing on fellowship work, the object of which is to encourage promising men and women to help themselves, their homes, their employer, their community and their country.

There is an increasing recognition on the part of the employers of the economical and social importance of health education as a plant asset, as well as its bearing on the individual happiness of the employes. Not merely is his physical condition important, as related to the job he has to do, but his education, habits, temperament, disposition and environment must be gone into, and just now, when a new sense of nationalism is being kindled in America, the timely subject of health is peculiarly significant. It is the aim of the industrial surgeon to develop health education, not merely through institutional and local agencies, but with the welfare of the whole country in view. Heretofore, comparatively little consideration has been given the health of the employe by the employer—such matters having been left to legislative activities, municipal and State and National. Each State and Territory in the Union has fairly efficient laws on sanitation and hygiene, as well as for safety and protection, for those in employment, but we are only now coming to realize that the problem is neither mechanical nor legislative, but educational. It is the equation of the man, mentally and physically, to accomplish the work he is doing; in order to have a safe shop he must be taught to realize that he must be a safe man—he must be educated to the fact that an impaired physical condition constitutes an extra hazard.

Much illness can be traced to the environment of the worker after the completion of his day's work in the shop. He may not consume the proper amount of good, nourishing food; his sleeping-room may be crowded or poorly ventilated, or both; or he may not dress properly for his work. A common cause for ill health lies in lack of care of his teeth —these may be poor or entirely gone. Poor digestion is a logical sequence and diseases follow which lessen efficiency. The worker may not get a proper amount of sleep because of toothache, sickness in the family or other causes; therefore, that personal hygiene is the maintenance of individual health must be clearly explained to him.

Many years of observation have taught the writer that proper recreation and improved home environments further efficiency to the mutual advantage of employer and employe. Many employes are ignorant of their conditions, or are neglectful or indifferent until warned by the examining physician; possibly they are refused a position because of physical defects. That in itself is educational to the worker and often arouses him to the extent of seeking relief through careful living.

In nearly every instance when an employe learns of his imperfect physical condition, he hastens to correct it. It becomes good, hard-headed business, based on sound economical principles with him. He has learned by the experience of others that sickness means a reduction in his earning capacity or a loss of time and labor, and that through right living only will his efficiency be increased. If he learns his lesson, he may live to enjoy the fruits of his labor, his children will have a father, his wife will not be left untimely a widow, and he will try to prevent being a broken man because of carelessness and neglect of his health.

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Starting a Safety Campaign

By F. C. Williams, Jr.

Plant Safety Inspector, The Fiberloid Corporation, Indian Orchard, Mass.

Proceedings of the Hampden County Safety Council, Springfield, Mass.

THE general subject of the evening is how to build guards, but for me to stand here and tell you older and more experienced men how to build guards would require as much nerve as was possessed by a certain young man who recently went into a restaurant without a cent in his pocket, planning on paying for his meal with the pearl he figured on finding in the oysters. So I will confine myself to giving you the results of our experience in safeguarding the employes of the Fiberloid Corporation.

Our first advice to those of you who are just starting your safety campaign, or contemplating doing so, is to get the proper proportion of mechanical safeguards and safety education. That is, do not attempt to eliminate all your accidents by merely building guards and, on the other hand, do not overfeed your help with "Safety First" talk at the outset.

At previous meetings of the council, the general feeling seemed to be that in order to start a safety campaign, the first thing to do is to advertise it by having a rally of the foremen and soliciting the co-operation of the workmen. But the chairman of our general committee, who, by the way, is our factory manager, has been handling that human being who goes under the name of factory workman for many years, and he has learned that to solicit the hearty co-operation of modern day workmen requires something more than to call them together and tell them that you are so interested in their welfare and safety that you are going to build guards at all dangerous points throughout the plant, and so forth and so on.

Our manager gave our safety campaign its biggest boost when he himself assumed personal charge, rather than turn it over to some subordinate official of the firm. He rounded out an ideal general committee by the selection of the clerk of the corporation and the mechanical engineer as the other two members. Let me repeat, gentlemen, the personnel of that committee: Factory manager, clerk of the corporation and the mechanical engineer. The fact that these highly paid officials give up several hours of their time each week to improve working conditions in the plant has had a wonderful effect in cutting down our accident record.

As plant safety inspector I was sent out on a still hunt through the plant to (1) thoroughly familiarize myself with the manufacture of our product, Fiberloid, so that I could better appreciate the dangers connected with the various processes through which it passes; (2) to look for all offenders known as chance-takers; (3) to study all accidents; and (4) to note all dangerous places where there was a chance of employes getting hurt and to recommend ways and means of eliminating the same.

At the same time a workmen's committee of three members was appointed to assist in locating all the unguarded points throughout the plant, and a foremen's committee, at the head of which is the manager of our novelty division. These committees and myself fired recommendation after recommendation at the general committee and it accepted all of them, except a few which it considered unpractical. In all, we have submitted 400 and some odd recommendations since July 12 last, ranging from the request of an electric light in a dark corner to asking for semi-automatic gates at the landings of our 18 elevators.

All of the inspections were carried on for the first four or five months

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without practically any advertising, so to speak. I was a newcomer to the plant and when I started to roam around and watch the various employes at their work they became a little curious. The next thing they knew three of their fellow workers, decked out with safety inspection pins, dropped in on them, looked here and there and passed on, and within a day or two after five of the department heads paid them a mysterious visit. Their curiosity at this stage of the game was very amusing. We then let them in a little on what was going on by posting the National Safety Council bulletins around the plant. As the days wore by guards gradually went up here and there, and the men began to receive special cautions from their foremen, who were quickly grasping the situation.

Now, after spending hundreds of dollars in building guards, improving sanitary conditions and working conditions in general, the management began to solicit the co-operation of their men. Could any of them with any degree of intelligence refuse? No!

One by one the men dropped in line without any urging or threats of being fired if they were not careful, so that today there exists between the employer and employes a spirit of co-operation that any firm might well be proud of.

Some of you may ask why we are so certain that we have obtained that co-operation, and here is our answer: A few weeks ago a small fire broke out in one of our departments, and owing to the fact that it was a heatless Monday, very few of our employes were on hand to check its progress, so that it began to look pretty gloomy for us, but orders were given to blow the factory whistle, which serves as an emergency call, and within 5 to 10 minutes a couple of hundred of our men were clamoring at the gate to get in and at that fire, and it was only that instant response and the splendid spirit shown by the employes that saved us from a mighty bad fire. And while these men were fighting that fire, cries were heard on all sides to "Watch yourself!" "Be careful now!" and "'Safety first,' Bill!" which proved that even under fire the "Safety First" movement stood the acid test.

On the other hand, do not build all of your guards first and neglect to warn the employes at the same time. That is a condition which does not exist in our plant, so that I must cite an example from my experiences with another firm.

It was two years ago, while I was serving an apprenticeship in an engineering school conducted by one of the largest electrical concerns in New England, a plant that is credited with possessing the most modern and safe equipment possible.

We were compelled to spend a certain amount of time in the shop on practical tool and machine work. Soon after starting my time, a group of us straight from high school, with no idea of the danger of the shop, were put to work out in the shops without a word of caution. The boss couldn't see how a man could be possibly injured, as the lathes were all independently motor driven—no belts or pulleys to get caught in, all the change and back gears guarded and in order to vary the speed of the motor it was only necessary for us to move a handle from one hole to another.

One of the boys was turning up his first piece of work in a lathe, taking the first rough cut, if I remember rightly, on an armature shaft, and a little oil had worked out from the dead center on to the piece, and he did not like the looks of the oil on his first masterpiece, so he took a piece of waste and attempted to wipe it off. Result: He had the first two fingers of his right hand actually pulled completely from their place, and left dangling on the cords of the arm.

The next day we were all called into the office by the department head and told what leatherheads we were, etc. That was the limit of our safety education, and we were the young men whom they were training to send out into their plant as foremen and leaders. So I repeat once more, "In building your safeguards, do not lose sight of the human element."

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Every 100 Soldiers Carry a Bale of Cotton

THE National Board of Fire Underwriters, in a pamphlet entitled "Safeguarding Cotton," states that the safety of the world is dependent upon American cotton, for the war is being fought with the product of the Southern cotton fields, chemically transformed into explosives. It has been computed that America produces three-quarters of the world's cotton supply, and that every 100 soldiers carry a bale of cotton in the shape of cartridges, while a battleship in action might use 10 to 12 bales a minute. In the light of this it is imperative for American producers and handlers of cotton, realizing its peculiar susceptibility to danger from fire, even in times of peace, to recognize the importance of safeguarding cotton, in wartime, as an essential feature of national defense. All premises where cotton is stored should be kept scrupulously clean, the rule of "no smoking" should be strictly enforced, and the careless use of matches carefully avoided. No strangers nor irresponsible people should be allowed on the premises, and carefully selected watchmen should insure a complete patrol of the property. All fire fighting appliances and equipment, such as casks and pails, hose, etc., should be kept in place and in good condition, ready for instant use. All fire doors should be tightly closed when the opening is not required for operating purposes. We are coming to realize that a large proportion of so called accidental fires are little less reprehensible than those deliberately started. The great cause of nearly all "accidental" fires is carelessness; and carelessness in wartime, affecting the country's safety is an extremely serious matter.

Save Your Eyes—You Need Them!

WHAT would you do if you lost the sight of your eyes? inquires the Gary Works *Circle* of the Illinois Steel Company.

What would the people do who were depending on you for their existence? Could you do the work you are doing now? Did you ever try to walk with your eyes closed and keep from bumping into things (even though you knew they were there before you started)? No, sir, it can't be done until after much practice, due to the fact, probably, that one's limbs are not exactly the same length, which has a tendency to make one walk in an irregular line or circle. That's getting away from the topic, which is more vital. Who wants to practice walking with their eyes closed? Nature gives us eyes to see with and light to see with and by. The eye is one of the most delicate and wonderful organs of ourselves and should not be abused. Take no risks with them. Treat them properly. You have known of people who have had to discontinue their work because their eyes went back on them; why? Because they abused them or did not take proper care of them, and often severe headaches are traced to our eyes.

There are many ways to protect the eyes, where different trades are practiced.

There is the man with chipping hammer or acetylene torch, Wear the goggles provided; not only the kind that are made to protect your eyes from being put out by a flying chip, but also those that are made to prevent strong lights from putting out your eyes little by little each day. You might think that, because the goggles you wear while chipping are

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cumbersome, they are a nuisance, or that the strong lights you are near each day do not bother you—Take no chances: be on the safe side and wear your goggles when your work demands it.

Don't look at a cast of metal, or a flush of slag, into a furnace, at a converter flame, or a bar, or ingot of white hot steel any more than you must, to do your work properly. If you work at a bench, endeavor to adjust your light above the level of your eyes; keep your globe and reflector clean and see that it throws the light down on your work.

When you are at work reading, writing or anything that demands concentration of your eyesight, keep the light at the back; whether it be artificial or natural, see that it comes over your shoulder and falls on the object you are doing. Use lots of light, for you need good eyes to do good work.

Coal-Mine Fatalities in 1917

By Albert H. Fay

Of the United States Bureau of Mines

THE abnormal conditions under which the coal mines were operated during 1917 are reflected in the accident records to the extent of an increase of 21 per cent in fatalities over 1916. The reports of the coal-mine inspectors to the Bureau of Mines of the Department of the Interior during 1917 account for 2,696 fatalities at the coal mines of the United States, as compared with 2,226 for 1916. There has been and is still an unusual demand on the operators for an increase in coal production which has been hampered by a congestion in freight traffic, and an apparent shortage of labor. Available data indicates an increase of less than 10 per cent in production. It is not possible to give the number of men employed in 1917, but preliminary reports to the United States Geological Survey indicate that in some States there was a slight increase in the number of men employed, while in others there was a small decrease. Estimates by State mine inspectors in 15 of the smaller mining States, representing one-fourth of the industry indicate about 10 per cent increase in the number of employes. Therefore, the total number employed in 1917 may not be much in excess of 1916, viz., 720,971.

Those mines which were able to secure cars to market their coal were operated on a full-time basis, which adds to the number of days the individual miner could work, thus lengthening the time he was exposed to the mining hazard. The risk encountered by the individual miner is proportional to the time exposed. Other mines which were not so favorably situated, as to dispose of their coal, operated only part time. This condition results in an increase of certain dangers, especially those due to gas, dust and falls of roof, which would not obtain in the case of the mine operating full time. The active mine will ordinarily be kept in better condition than one operated only part time.

The shortage of mine labor, labor required to keep pace with the increased demand for coal, is due to the attractive wages in munition factories, enlistments, and drafts into the army, a relaxation in immigration, and to emigration of many miners early in the war. It has been necessary, therefore, to employ new and inexperienced men from other fields to replenish this shortage. Many of the experienced mine foremen and safety engineers have either enlisted, or been drafted into the army, or secured more remunerative employment elsewhere, with the result that less experienced foremen have been placd in charge of some of the workings. With the exceedingly large demand for coal, it has not been possible for the operators and others concerned to give as much attention to accident prevention at the mines as was being done in recent years under normal conditions.

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EDITORIAL

Broadened Into Real Popularity

THE annual meeting of the National Fire Protection Association, to be held in Chicago next month, will be fully reported in SAFETY ENGINEERING. At no previous time in the history of the country has fire prevention in the United States meant as much—to the people of other nations, as well as to the people of this country. Nor has equal progress in the science of checking the American fire waste been made in any other period. In co-operation with the Government, for the protection of the United States and its Allies, fire protection engineers have worked steadily and accomplished a great deal, particularly by preventing the combustion of food supplies, cotton and other important staples.

Fire underwriters, perhaps, have observed that they are no longer laboring by themselves in the campaign to reduce the number of fires. There are other labels, as well as the fire underwriter's label, on fire prevention activities.

These activities, now an important part of the general safety movement, are supported by national industrial organizations, State industrial boards and labor departments, State insurance departments, casualty insurance companies, chambers of commerce, boy scouts, etc. This combination of effort has changed "Fire Prevention Day" to "Fire and Accident Prevention Day."

Well organized plant fire departments exist by the thousands. The movement is popular and broad instead of unpopular and narrow, as it was, for years, when it was conducted solely by fire insurance interests. SAFETY ENGINEERING is proud to have "done its bit" in expanding the fire prevention scheme from a mere property saving enterprise to its present place in the nation's work to safeguard the human lives and limbs of its citizens, especially the workers in factories.

Industry Must Win the War

AT a reception in London to the American Standardization Board, R. W. Diffen, a British engineering expert, stated that the present war was one in which 85 per cent depended upon industrial effort and 15 per cent on military effort. He declared the secret of victory was to combine the two into 100 per cent efficiency.

Never before has industry shouldered so far-reaching a responsibility. The overwhelming contribution to victory must come from industry. To meet the stupendous demand, efficiency and safety are vital requirements. Let industry keep in mind that 85 per cent of the effort to win the war must come from its ranks. Until victory is achieved by America and its Allies, the fate of mankind will hang in the balance. Could industry exert itself to the utmost for a greater or a worthier cause?

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all industries to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Safety Principles Are Common

PRESIDENT VAN SCHAACK of the National Safety Council, in his addresses before the different industries, emphasizes the fact that the principles of safety work are similar in every line of manufacturing and that most of the accidents in any plant are due to ordinary and common causes. Of course, particular industries have certain danger spots peculiar to themselves, but the accident prevention problem is, nevertheless, very much the same thing in every industry. Addressing paper manufacturers recently, he said:

"A committee of the Paper and Pulp Section of the National Safety Council, some months ago made an analysis of accidents in a number of mills which showed that of the 22 principal causes of accidents only 7 were peculiar to the industry. A study of accidents in Wisconsin paper mills gave a similar result. These investigations go to prove that accident conditions, generally, in paper and pulp mills are not unique—that the principles of safety work which are proving successful in other industries are the very ones applicable to your own, and that the results obtainable elsewhere, from the application of these principles, can be obtained in your plants.

"I would not be understood as belittling the dangers of your specializing machines and operations, your calenders, and other machinery having in-running rolls; your barkers, your winders and reels, your rag and paper cutters. They deserve your most earnest attention and in a well-organized safety campaign they will receive it.

"A well-organized campaign—that is the secret of success in safety work in every branch of industrial endeavor. The safety activities of a plant must be recognized to be just as much a part of the business as is the turning out of product, if genuine results on a business basis are to be obtained. You can no more afford to be slipshod with the one than with the other. Just as you analyze your production problem, so must you diagnose your safety needs. No correct remedy can be applied in the absence of a diagnosis or in the presence of an incorrect one. To accomplish anything worth while with your accident prevention efforts, you

Translation: "Soldier! Look at this enemy. He is worse than the Boche. Fight him! Use all of the resources that science puts at your disposal."

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must first make a careful study of working conditions, a painstaking analysis of accidents occurring under them, and a searching inquiry into potential causes of accidents that may not have occurred. Only by so doing will the hazards to which workmen are exposed be truly determined and the correct means of overcoming them indicated."

Fire Congress in Ohio in May

THE Fire Prevention Committee of the Industrial Commission of Ohio is planning a big, patriotic Fire Congress to be held in Memorial Hall, Columbus, during the week of May 27, according to an announcement by Victor T. Noonan, State Safety Director. State Fire Marshal T. A. Fleming is co-operating with the committee and is planning to call all the fire chiefs of the State to the congress, which will be formally opened by Governor Cox and Mayor Karb, and, probably, a rominent government official from Washington will be present.

The purpose of the congress is to awaken the fire conscience of the people of Ohio to the necessity of reducing the numerous fire losses, protection of human life from hazard, and to emphasize the importance, in these war days, of protecting food supplies from destruction by fire.

Ohio is the first State to make an effort to unify and co-ordinate fire prevention work in this way. Every manufacturing, engineering and business organization in the State, including chambers of commerce, manufacturers, builders, engineers, architects, credit men's associations, retail merchants and school superintendents, will be invited to send delegates to the congress.

There will be round table conferences confined to the study of fire hazards peculiar to certain industries, for instance: the hazard of fire in the paper industry or textile trade; the hazard of fire in the volatile industries, such as oils and paints. The question of smoking in industries and mercantile establishments, such as department stores, will be discussed with the view of formulating regulations on this hazard.

Addresses will be delivered during the congress by some of the best known fire prevention experts in the country, and motion pictures will be shown illustrating the causes and prevention of fires.

The Industrial Commission's Fire Prevention Committee represents the fire prevention members of the Chambers of Commerce of Cleveland, Cincinnati and Columbus. The committee also represents the National Fire Protection Association, Cleveland Inspection Bureau, Ohio Manufacturers Association and the Ohio Federation of Labor. The members of the committee are:

C. B. Cranston, Livington Seed Company, Columbus, chairman.

F. W. Elliott, architect, Columbus.

W. B. Goodwin, National Fire Protection Association, Columbus.

C. H. Patton, Cleveland Inspection Bureau.

J. J. Conway, superintendent, Salvage Corps, Cincinnati.

The Ohio Federation of Labor is represented by:

Thos. J. Donnelly, Columbus, Ohio.
John G. Owens, Cleveland, Ohio.
Eli Polack, Cincinnati, Ohio.
T. J. Creager, Springfield, Ohio.
John J. Graney, Youngstown, Ohio.

President Wilson has made a strong plea to reduce the fire losses by a united effort and as a patriotic duty. Governor Cox has made a similar appeal and is intensely interested in the work of the Industrial Commission's Fire Prevention Committee.

Victor T. Noonan, Director of Safety for the Ohio Industrial Commission, is in charge of the work of the fire prevention committee.

Edison Safety Meeting

THE Edison Storage Battery Company and Edison Phonograph Works held an enthusiastic safety meeting, Wednesday evening, March 20, at Orange, N. J., with over 300 "Safety First" workers in attendance. R. A. Bachman, vice president and general manager of the Edison Storage Battery Company, presided at the meeting, and the quarterly chart showed a reduction in accidents of 33 1-3 per cent at the

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Edison factories, a splendid showing. Interesting motion picture reels from the Ellsworth Collieries Company and the United States Bureau of Mines, showing safe and unsafe practices in bituminous coal mines, were exhibited and explained by H. D. Mason, Jr., secretary of the Mine Safety Appliance Company, Pittsburgh, Pa.

Spring Safety Suggestions

THE Frankford Arsenal Safety Department has distributed cards among its employes, the substance of which SAFETY ENGINEERING reproduces, but not the typography, which is unique and effective:

"That you may feel too tired is no excuse for keeping your shop in an untidy condition. At this time of the year there is a feeling in the air that nature will soon be bursting out in full bloom. Spring is coming. The thrifty housewife cleans house. 'Nuff sed.'

"Waste and rubbish of all kinds should not be allowed to accumulate in shops. This matter must receive daily attention in order that your shop may be kept clean at all times. Foremen must see that all waste material is promptly removed from shops.

"Look around for the upturned nails. They are exceedingly dangerous. Any person who carelessly throws boards with upturned nails in them around on the grounds is not mindful of his own or any other person's safety. We want only careful persons here. Turn down the nails."

Workmen Interested in Safety

THAT labor is becoming interested in "Safety First" methods is evidenced by an instructive free exhibition recently given in Lancaster, Pa., of motion pictures showing safeguards against accidents, under the auspices of the Lancaster Central Labor Union and by the Compensation Board of the State of Pennsylvania.

Safety in Technical Schools

THE American Museum of Safety is co-operating with the National Safety Council in a plan to have a course of study in industrial accident prevention included in the curricula of the technical schools in the United States. The museum's director, A. H. Young, is serving on the Committee on Promoting Safety Education in the Technical Schools and Colleges, recently appointed by the National Safety Council, of which A. W. Whitney, general manager, National Workmen's Compensation Service Bureau, is chairman. Other members of the committee are C. P. Tolman, National Lead Company; Professor Dexter S. Kimball, Sibley College, Cornell University, and Chancellor S. B. McCormick, University of Pittsburgh.

Fatality Rate in Explosives Industry

A YEAR ago SAFETY ENGINEERING published statistics of fatal accidents among employes of E. I. duPont de Nemours & Co., showing a reduction in the number of fatalities, notwithstanding the very large increase in the number of employes. Brought down to the end of 1917, the fatality statistics of this company, per 1,000 employes, year by year, since 1908, is given below:

1908	9.17	1913	4.72
1909	5.38	1914	1.70
1910	5.66	1915	2.04
1911	3.24	1916	2.41
1912	2.04	1917	1.18

Lansing's Safety Campaign

RECOGNIZING the need for an active city-wide campaign, owing to the many war orders being filled in Lansing, the Michigan Employers' Casualty Company, through its safety bureau, founded a safety organization in October, 1917, which has nearly 100 members, representing practically every industry in the city. The organization, known as the Lansing Bureau of Safety, started its work without the requirement of dues, in order to offer inducements to employes and individuals. The bureau hopes to serve as a clearing house for safety work for all the industries in the city of Lansing and its vicinity. C. E. Livingston, safety engineer for the Reo Motor Car Company, the largest single employer of labor in Lansing, is president of the bureau, and has turned over the safety films

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of the company, and offered the use of the large auditorium of the Reo clubhouse for meeting purposes. Monthly meetings of the bureau are held in auditoriums of the various plants and at the chamber of commerce.

"Safety First" in Chemical Plants

IN the February number of SAFETY ENGINEERING, brief mention was made of the General Chemical Company's Bayonne plant where, in 1917, out of a total of 584,296 working hours, only 148 hours' lost time on account of accidents—less than .03 of 1 per cent—was recorded. Nor is this all of the story. At the Illinois works of the same company, during the same period, 70½ hours' lost time in a total of 146,186.25 work hours, or about 1/20 of 1 per cent, was reported. From August 1, 1917, to January 1, 1918, there was no time lost because of accidents at the Illinois works. Between December 1, 1916, and March 1, 1917, the Bayonne works, with its 214,220 hours of working time, reported no lost time for accidents.

Oil Storage Hazards

LOCATED a hundred feet below the factory of the Philadelphia Rubber Works, on the same side of the Schuylkill river, is a large oil refining plant, and it was reported that late in the afternoon of February 16 there was an explosion of some kind that threw oil out upon the river. The fire marshal's office states that just previous to 11 o'clock a fireman cleaned his fires while the locomotive was on the railroad bridge, which crosses the river 300 feet or more below this plant. Live coals are supposed to have set fire to the oil, and as the tide was setting upriver the burning oil approached the plant. The night engineer, with the help of one or two employes, laid lines of hose from the hydrants and started the fire pump. The alarm was rung at 11 p. m. In all, one fireboat and 16 steam fire engines were summoned to extinguish the fire, which extended possibly 1,000 feet up and down the river. About 11:15 p. m. the burning oil had reached the bulkhead around the filter house, but with the aid of large fire streams on all sides and 36 sprinklers which opened inside the building, the fire was extinguished in from one to two hours. The corrugated iron siding on three sides of the building was warped and the paint blistered, but the frame of the building was not damaged materially. Glass on the west side of the main buildings was broken, due to heat. The fire communicated to a pile of rubber tire beads stored in the yard, and the fire in these burned until 2 o'clock the next afternoon. Loss, estimated, $3,000 to $5,000.

The Boston Manufacturers' Mutual Fire Insurance Company, which supplies the foregoing particulars, says:

"This fire emphasies the hazard which comes from storing oil in such a way that by accident or otherwise it can reach rivers or other bodies of water where, floating on the surface, if ignited, fire damage will follow, due to the burning oil spreading fire to surrounding property. The same condition might arise in a factory yard, due to storage of oil above ground if any accident followed by fire occurred which might allow the oil to be discharged upon the ground in consequence of fire or explosion. Oil storage hazards are well recognized, and the necessity of providing for safe handling and storage in each case is evident."

Code For Electrical Appliances

UNDERWRITERS' Laboratories' Code for Construction and Test of Electrical Appliances, Volume 1, has been published and distributed. It is an indispensable reference book for electrical engineers; 382 pages.

Accidents in Quebec Mines

DURING the calendar year 1917 the number of men employed in the mineral mines, quarries and concentrating mills of the Province of Quebec was 6,311, as compared with 6,601 for the preceding year. The figures are on the basis of 300 days' work. The work in the mines was unusually

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active. Although a large number of men new to conditions of the mines found employment, the total number of accidents was less than in 1916. The number of fatalities was notably less—4 against 18. The total number of accidents reported to the Bureau of Mines during 1917 was 172. Only accidents resulting in a loss of time of more than 10 days are reported to the Quebec Bureau of Mines.

Safety in Fire Prevention

THE annual meeting of the National Fire Protection Association is to be held in Chicago on May 7, 8 and 9. During the week of May 27 the Industrial Fire Prevention Committee of the Industrial Commission of Ohio plans to hold a Fire Congress in Memorial Hall, Columbus, O. The large appropriations authorized by Congress for fire-resistive construction of Government buildings of all kinds, including workmen's dwellings, give an unusual interest to the efforts being made by the advocates of fire-resistive construction to interest the Administration. Several N. F. P. A. members and the Associated Metal Lath Manufacturers have submitted to Secretary Baker comprehensive data to show that the advantages of fire-resistive buildings can be secured for an additional cost of between 5 and 10 per cent over the price that is now being paid for non-fire-resistive work.

American Public Health

THE next meeting of the American Public Health Association is to be held in Chicago, October 14-17. The central theme of the meeting is to be "The Health of the Civil Population in War Time."

Anti-Freezing—Automobiles

INVESTIGATIONS of anti-freezing solutions in connection with automobile radiators have been conducted by the Bureau of Standards, Washington. The use of kerosene or similar oils as freezing preventives is condemned not only because of the dangers of inflammable vapors, but because of their high boiling point and effect upon rubber. Calcium chloride solutions should be used with caution, if at all, on account of their corrosive action. The bureau finds that there is little to choose between wood alcohol and denatured alcohol provided that adequate care is taken to ascertain that the former is free from acids. Wood alcohol is more volatile, but its lower freezing point allows a less amount to be used, thus perhaps counteracting the disadvantages of greater volatility. The use of glycerine is discouraged on grounds of price and the demand for this commodity for the manufacture of munitions.

Fire Protection in Factories

AS winter is now past and there is no further danger from freezing of fire apparatus, the Factory Insurance Association presents the following recommendations and urgently requests favorable action upon them:

1. Examine all pipes and sprinklers where water has been turned off, and be sure there are no low points or traps where water has accumulated, frozen and burst the pipes. This should be done before water is turned on to prevent leakage and possible water damage.

2. Where water has been turned off from sprinkler pipes, be sure to wash the rust and sediment out of mains before turning on.

3. Where valves without indicators are to be opened or closed, be sure to determine the proper direction to turn them, and when positive they are as required (open or closed) then seal them with riveted strap passing through hand wheel on valve and around the pipe.

4. If there are any leaks when pressure is turned on underground pipes, make prompt repairs, so that water may not damage underpinning or flood basements.

5. Try all hydrants while under fire pressure to see that they open easily, and where necessary apply lubricants.

6. Make actual test of fire pumps, through several lines of hose, working pumps to full capacity.

The association especially urges the adoption of dry pipe system for the protection of buildings where water is liable to freeze, and which have been shut off for this reason during the past winter, thus guarding yourselves against damage to apparatus and property, and furnishing constant protection for yourselves and for the insurance companies.

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Course in Safety Engineering.

CO-OPERATING with Hampden County (Mass.) Safety Council the Department of University Extension is conducting a course of 12 lessons in safety engineering at the Y. M. C. A. building, Springfield. This is the first course of its kind to be established in the country. It is open to foremen, superintendents and mechanics.

Excessive Labor Overturn

EXPERTS estimate that it costs from $40 to $150 to hire, fit and fire a workman. The Rock Island Lines, in prosecuting track-elevation work in Chicago, found it necessary to put 2,874 names on the payroll in six months to keep a force of 400 working. In the United States shipbuilding yards the labor overturn is 500 per cent, according to Meyer Bloomfield, expert for the United States Shipping Board. A Pittsburgh corporation with a steady payroll of 16,000 men had a labor overturn in 1916 of 187 per cent. In 1913 Henry Ford lost $2,500,000 in hiring, fitting, and firing 52,445 men, to keep a working force of 13,000, while the men lost $454,000 in wages.

Victor T. Noonan of Ohio

PRESIDENT FULLER of the American Foundrymen's Association, has appointed Victor T. Noonan, State Director of Safety for the Ohio Industrial Commission, chairman of the A. F. A. Safety Committee. This is Mr. Noonan's third year to serve as chairman of this committee, which is a recognition and an honor for a State official to hold.

Wilson Joins Museum Staff

SAFETY men familiar with the record of the safety department of the Delaware, Lackawanna & Western Railroad will be interested to learn that William C. Wilson, secretary of its Central Safety Committee, has recently joined the staff of the American Museum of Safety, as assistant to the director. In 1911 Mr. Wilson was instrumental in effecting the safety organization of the D., L. & W., the first of its kind in the East, with respect to its educational features. Mr. Wilson was a member of the first executive committee of the railroad section of the National Safety Council, and was made chairman of the section at the Detroit Congress in 1916, at which time he was also elected a director of the National Safety Council.

Child Welfare Laws

A NEW study of child welfare conditions has been made, and the report of the investigation published by the National Child Labor Committee under the title, "Child Welfare in Oklahoma." This study, made by the National Child Labor Committee at the request of the University of Oklahoma, is of special interest because, although one or two States have appointed commissions to study existing child welfare laws and recommend changes, Oklahoma is the first State to gather information as to actual conditions as a basis for legislative action. The demand that such an inquiry be made, according to Edward N. Clopper, of the National Child Labor Committee, under whose direction the study was made, is evidence of the growing interest in the codification of child welfare laws as a substitute for present piecemeal legislation.

Even Safety Signs Are Dangerous

THERE is one stock employe in Milwaukee who does not believe in the "Safety First" business. L. Rusch, 174 Stewart street, Milwaukee, counts and weighs live stock for the Pfister & Vogel Company of Milwaukee. One day in March Rusch was injured. The report of his accident came to the Industrial Commission as follows: "This man was counting stock in the chrome yard when one of the 'Safety First' signs fell down, striking him on the back of the neck and injuring him." Compensation was awarded him.

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Don'ts for Shipbuilders

THE following list of "Don'ts," published in *Heave Together*, the North West Steel Company's paper, apply as well to workers in shipyards as in steel mills:

Don't throw rivets carelessly.
Don't pass under sling or crane loads.
Don't leave tools or material on staging.
Don't fail to keep all safety guards in place.
Don't violate your employer's safety rules.
Don't fail to keep clear of lines and blocks.
Don't injure your fellow worker by your carelessness.
Don't go onto a staging unless you are sure that same is safe.
Don't sit or lean on safety rails or braces; they sometimes break.
Don't throw anything from staging; you may hurt someone below.
Don't fail to wear goggles, when required; you may lose your eyesight.
Don't carry spud bars, wrenches, drift pins, bolts or rivets in your pockets.
Don't jump from one staging to another; there is always a way around.
Don't fail to examine all hooks, slings, and other rigging before using them.
Don't use defective tools; your foreman will furnish you with proper ones.
Don't fail to report to your foreman when staging or rigging is in need of repairs.

Danger in New York Harbor

THE Merchants' Association of New York City recently called the attention of the War Department to the possible danger of an explosion of munitions in New York harbor, with its probabilities of a more terrible disaster than the explosion at Halifax. An immediate investigation of the situation was made, and the Secretary of War informed Senator Calder that the War Department is now considering a plan for shipping all explosives from Carney's Point, N. J., as the British Government has done for some time past.

Safety for the Household

THE safety of the home is the subject of a pamphlet issued by the Bureau of Standards, Department of Commerce, entitled "Safety for the Household, Bureau of Standards, Circular No. 75." Dangers due to the increasing use of gas and electricity, household chemicals, volatile oils and poisons, are recited, with the intention of removing needless risk and fear, and developing intelligent caution where the hazard cannot be entirely avoided. The circular emphasizes the seriousness of some of the risks not generally known, and aims to guide the formation of habits of carefulness; also it suggests effective home equipment to minimize the risks involved and encourages public measures to provide safety for the household and community. This circular completes a series of three dealing with measurements, materials, and safety, which form a valuable addition, by the Bureau of Standards, to the literature of household management.

Harmonious Co-operation Necessary

THE experience of years of accident prevention work teaches that satisfactory results may be achieved only by reaching the individual, a writer in a Travelers' Insurance Company publication asserts. It is essential, of course, that a workman be taught to perform correctly certain operations at a gainful occupation, but if in doing this we fail to teach him the importance of doing his work safely, as well as correctly, his training will be incomplete. Together with the training of the man in personal safety and the technics of his trade, instruction should be given which will enable him to harmonize his individual ability and skill with that of his fellow workmen, similarly trained, so that co-operative action may be obtained, without which true efficiency cannot be realized. Individual skill, ability, and safety, though necessary, are not sufficient to secure immunity from accidents. There must be harmonious co-operation among all persons concerned in order to realize success in accident prevention.

Conserve the Forests

COMMISSIONER of Forestry Robert S. Conklin, of Pennsylvania, issued his annual warning of the approach of the forest fire season. Pure carelessness caused the burning of 150,000 acres of

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forest in Pennsylvania in 1916, and of more than 500,000 acres in 1915. "Unless we get the active help of every man who visits or lives near the forests," says the commissioner, "we can expect nothing better than a repetition of last year's record, which was above the average. A man who would not think of burning his neighbor's barn will thoughtlessly allow his brush fire to escape and burn over his neighbor's woodlot, which may contain in embryo material for a hundred barns."

The following suggestions are offered to help conserve Pennsylvania's forests: (1) If you see a fire, try to put it out. If you can't put it out, immediately notify the nearest forest fire warden. (2) Break your match in two before you throw it away. If you are one of those who "can't see no sense in that," try it. (3) Bury your pipe ashes and cigar or cigarette stubs, or else throw them into a stream. (4) Have a cleared spot at least 10 feet in diameter around your camp fire and then be sure the fire is out before you leave it. (5) If you own or use engines, put spark arresters on them. It may save costs and damages later on. (6) Don't burn brush on a dry, windy day. If in doubt, ask the fire warden."

"Why Not Now?"

A PERTINENT question appears in a recent number of *The Chesapeake & Ohio Employes' Magazine*: "Why Not Now? Sooner or later you must get the safety habit if you expect continued employment by any manufacturing concern in this country."

What to do When Hurt

IF hurt while working, tell your boss or foreman at once how and where you were hurt and ask for a doctor. You must go to the doctor to whom he sends you or pay your own doctor bill. Even a sliver or scratch should be reported; blood poisoning may result. Your prompt report of injury is important. Your employer, if under the compensation law, should pay you compensation weekly while you are disabled, but you cannot collect for the first seven days unless disabled beyond 28 days. The first payment is due on the fifteenth day after the accident. If not paid then, give your employer notice in writing of your claim, within 30 days after the accident, stating how and when you were hurt. This advice is given by the Industrial Commission of Wisconsin.

Ignored the Warning

BOILERMAKERS doing construction work were working on a swinging scaffold about 15 feet above the ground. A laborer walked underneath, and as he did so a tool fell from the scaffold and struck him. He sustained a bad cut on the head. There was a sign on the ground reading "Warning—Workmen Above," and the man knew the boilermakers were there. But he took a chance, which cost him not only much pain and suffering, but also about 50 per cent of his wages for several weeks.

Practice Safety at All Times

STATISTICS show that in the United States during the year 1916 there were approximately 50,000 fatal accidents and 600,000 serious injuries. One-half of this enormous number have been classified as accidents occurring to employes of the manufacturing industries and public service companies throughout the country—50 per cent of which could have been avoided if workmen had not been careless, while another 25 per cent may safely be attributed to thoughtlessness. Needless accidents can only be eliminated by everyone practicing the rules of safety at all times and in all places.

Test for Rope

ROPE and binder twine are made from hard fibers such as manila, sisal, and New Zealand hemp, manila being the best for various reasons, especially its resistance to mildew. No test has been known whereby the purchaser might be certain of what he was buying. Mr. C.

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E. Swett, of Arthur D. Little, Incorporated, recently discovered a method of determining this with certainty, and the test has been adopted by the United States Bureau of Standards. It consists in freeing the rope from oil, soaking it for 20 seconds in a solution of bleaching powder acidulated with acetic acid, rinsing in water, then in alcohol, and exposing for a minute to ammonia fumes. Manila fiber turns russet brown, all other rope fibers, cherry red.

Five-Year-Old Safety Expert

BILLY SIMPSON BERRY, five-year-old son of J. E. Berry, yard conductor at Huntington, W. Va., was out for a walk with his father. The lure of the rail attracted them to the Chesapeake & Ohio road, near their home, to watch the trains roll by and see the mysterious workings of the automatic block. The child, always keenly observant, noticed that the conditions of the rail were different, and called to his father. The older man immediately saw the danger, hurried home and telephoned the yard master, who rushed the work train out to make repairs. A piece of brake beam had dragged and moved the guard rail and broken both angle bars on the opposite side, and a large piece of rail was missing near the joint at the frog of the switch.

Safety Rules for Steel Workers

THE Inland Steel Company, Indiana Harbor, Ind., publishes a readable and instructive monthly paper. At the top and bottom of each page good advice is given to workmen in short sentences. These are from the February number:

When handling material be careful so that you do not drop it on your feet.

Keep your fingers out of danger. Use tongs, hooks or bars in dangerous places.

During 1917, 1,516 men had their hands injured at Harbor Works. Be careful when handling material.

When handling rough or sharp material wear hand leathers or protected gloves to prevent cuts.

When dropping material from your hands be sure it will not fly up and strike you.

During 1917, 670 men had their feet hurt at Harbor Works. Be careful when handling material.

Soiled hands are the best insurance against a soiled character.

Take hold of material so your hands will not be caught under it when you let it down.

Cut out the handling material accidents. Study ways and means to do your work safely.

You can't get the Safety Habit by carrying a horseshoe.

During 1917, 60 per cent of all accidents at Harbor Works caused injuries to hands or feet.

About 26 per cent of the total number of accidents at Harbor Works during 1917 was due to "Handling Material by Hand."

America needs every man. Stop accidents due to handling material by hand.

In the modern scheme of things waste has to go! Accidents are waste.

Save your eyes. A blind man has little earning power.

Wear safety shoes. They are on sale at the store room. They protect your feet from accidents.

The wages of sin is death. Keep your body clean and pure and avoid the diseases of death.

Take your safety habits home with you. See that your stairs are not used for storage so that your wife may trip and fall. If there are rags or papers in closets or cellars clean them out. Fires start in just such accumulations. Apply to your home the same inspection methods that the safety committees use here.

Dangerous Shoe Dressing

A DRESSING for white leather shoes bore the label, "This preparation is non-inflammable." By analysis the Public Safety Commission of Chicago found that it was 51 per cent gasoline. A somewhat similar preparation was found to contain 50 per cent gasoline. Immediate action taken by the commission led to the placing of these compounds on the prohibited lists of the post office and express companies. Drug stores and department stores agreed to stop selling them. Later the manufacturers were compelled to change the formulas.

Think of Safety, Not of Excuses

THE Pacific Gas & Electric Company observes that injured employes are usually very versatile in finding excuses for accidents. It proclaims: "If the same amount of energy and thought had been

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given to preventing the accident as to thinking up excuses after it, the accident would not have taken place. The injured workman would have been spared the pain and loss of wages caused by the accident, and the management would have been spared the reflection cast upon it by the thoughtlessness of its employe."

How to Throw Water

THE United States Department of Agriculture pleads thus with those who are endeavoring to put out a fire: "If you find flames breaking out in your house, don't just grab a pail of water and discharge it blindly in the general direction of the fire. The knack of throwing a broad sheet of water in a semi-circular sweep is easily learned, and is useful on a spreading fire on the floor. The water should be applied to the base of the fire, and not to the flames and smoke. Water dipped out with the hands or a dipper or a broom and sprinkled on the fire is often more effective than that thrown on the fire from a distance."

Chicago's Public Safety Commission

THE Public Safety Commission of Chicago and Cook County was created in September, 1913, by Coroner Hoffman. The latest annual report of the commission summarizes its four years of operation.

The commission has established beyond question the value of its several branches of work for the conservation of life.

"Human values were never so great and never in so much demand as now. In a world war, men are drawn for military service and the cry is everywhere heard for men and women to meet the stress and strain of industrial work in farm, factory and home. The records of the coroner's office show that more than 6,000 violent or sudden deaths occur annually in Cook county, of which more than one-half are termed accidental. The Government mortality statistics show that more than 50,000 deaths from accidental causes occur in the United States annually and authorities generally agree that 75 per cent are preventable. Thus, if the present war should be so disastrous to this country that we lose 300,000 men, our life loss in peaceful pursuits, by preventable accidents, woud, in ten years, be even greater."

Valuable education has been furnished by the circulation of printed bulletins, articles furnished to magazines, newspapers, and, most important for the past year, the reissue of a new edition of the book, first published in the early part of 1915 under the title of "Things You Must Know for Safety." The subject matter has been carefully edited and is almost wholly new.

Following the shocking accident in Chicago, on October 23, 1916, in which four lives were lost by the plunging of an automobile into the river at the 12th street bridge, the commission directed its officers to make a complete report of the conditions of the bridges of the city. A commission on "bridge safety equipment" was appointed.

In relation to automobile traffic the safety of the public has been largely assured by the activities of the commission.

A majority of the schools were found to be without protection or warning signs, but the board of education has since placed warning signs in the vicinity of all schools.

Last year the commission published a list of more than 70 volunteers who shared in the work of addressing, on safety subjects, more than 300,000 children at the public schools.

"Activities for safeguarding life are promoted and in many instances maintained at considerable cost by employers of labor in the factories, stores, department houses, etc., in the city and county. In almost every industrial field throughout the country, safety departments are established and financed by employers of labor. Practically all railway companies are now doing this with very marked results. . . . When the nation was aroused to the insanity and waste of the old Fourth of July chaos and lawless celebration the annual sacrifice of human life was re-

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duced to a minimum. In 1909 there were 215 deaths and 5,092 injured by the use of explosives. In 1916 this number was reduced to 30 deaths and 850 injured, and in 1917 the number was still less."

Protests against recklessness and lawlessness must be thundered at the doors of the legislatures, city councils, the courts and the police authorities. The pulpit, the press, the school must co-operate to enlighten the people. The message of safety must be carried into every home.

Novel Inspection Plan

IN order that the firemen of Fitchburg, Mass., may become better acquainted with conditions in all parts of the city, says the *Municipal Journal*, an innovation which has proved a decided success has been introduced in the regular monthly inspection of the sections of the city by the fire department. In each of three districts one or two extra firemen from other sections of the city accompany the one inspector of the district, who usually makes his round alone. This plan gives five men an opportunity to become better acquainted with a district which they are likely to have to fight a fire in at some time, even though their station is not in the section. It is possible to send extra men with the firemen who regularly make the tour of inspection only when none of them are taking their one day in five off, because at that time only is it possible to withdraw a few men without crippling the work of the department. The only time when the one day off in five rule does not hold at the local fire stations is when the month has 31 days. On that day all the men are at their posts, and accordingly on only seven days in the year can such a plan be used.

Celluloid Ignited by Steam Pipes

A PACKAGE containing pyroxylin plastics (celluloid) in sheets, wrapped in paper and bearing no marks to indicate the nature of the contents and no yellow caution label, was handled as an ordinary express shipment. On account of its cylindrical shape the package was placed on a pile of bread baskets. White smoke was first noticed and fire discovered while the train was in motion, and in less than five minutes the car was a mass of flames. The smoke issued immediately from behind the pile of bread baskets near the steam pipes. Evidently the package rolled from the top of the baskets and fell against the heated steam pipes, ignition of the celluloid resulting. The car and its contents, about 400 express packages, were destroyed. Proper marking and packing of the shipment would have indicated that it should not have been placed near the steam pipes. Wire netting or guards would have prevented the package from coming in contact with the steam pipes or radiator.

Unprotected Open Switches

UNPROTECTED open switches are dangerous, as an employe frequently makes an attempt to operate such a switch, and as a result of reaching out carelessly, not watching what he is doing, his hand comes in contact with the "live" portions of the switch, and another person is liable to be badly burned or possibly killed through his own carelessness. Yet the careless person is not alone to blame, since the accident could not have happened had a safe type of switch been installed.

Paper Mills Safety Results

GEORGE G. HAMBRECHT, chairman of the Industrial Commission of Wisconsin, in a recent letter to the Marathon Paper Mills Company, Rothschild, Wis., stated that since the inauguration in July, 1917, of a well-defined safety department in connection with the Industrial Commission, through the co-operation of employers, accident frequency in that State has been reduced 14 per cent.

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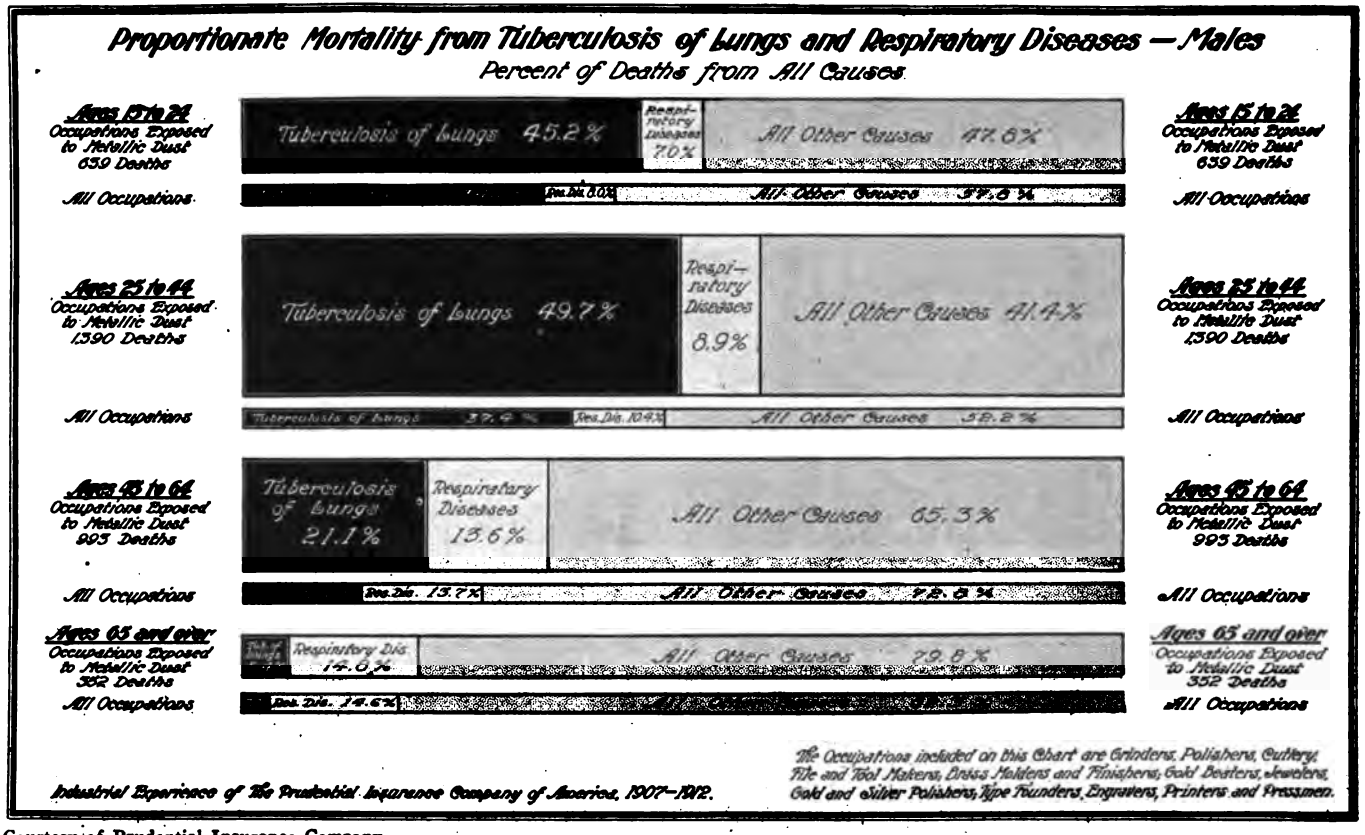
Mortality in Occupations Exposed to Metallic Dust


Proportionate Mortality from Tuberculosis of Lungs and Respiratory Diseases — Males
Percent of Deaths from All Causes
Ages 15 to 24
Occupations Exposed to Metallic Dust
639 Deaths
Tuberculosis of lungs 45.2%
Respiratory Diseases 7.0%
All Other Causes 47.8%
All Occupations
Tub. Dis. 8.0%
All Other Causes 37.8%
Ages 25 to 44
Occupations Exposed to Metallic Dust
1,390 Deaths
Tuberculosis of lungs 49.7%
Respiratory Diseases 8.9%
All Other Causes 41.4%
All Occupations
Tuberculosis of lungs 37.9%
Res. Dis. 10.9%
All Other Causes 51.2%
Ages 45 to 64
Occupations Exposed to Metallic Dust
995 Deaths
Tuberculosis of Lungs 21.1%
Respiratory Diseases 13.6%
All Other Causes 65.3%
All Occupations
Res. Dis. 13.7%
All Other Causes 72.3%
Ages 65 and over
Occupations Exposed to Metallic Dust
352 Deaths
Tub. of Lungs
Respiratory Dis. 14.8%
All Other Causes 79.8%
All Occupations
Res. Dis. 14.6%
Industrial Experience of The Prudential Insurance Company of America, 1907–1912.
The Occupations included on this Chart are Grinders, Polishers, Cutlery, File and Tool Makers, Brass Molders and Finishers, Gold Beaters, Jewelers, Gold and Silver Polishers, Type Founders, Engravers, Printers and Pressmen.

Courtesy of Prudential Insurance Company.

The Prudential Insurance Company of America, under the direction of Dr. Frederick L. Hoffman, its statistician, has prepared a series of charts of very great value to all persons interested in the prevention of accidents. Through the courtesy of the Prudential, a number of the charts have been published in SAFETY ENGINEERING.

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Inspections to Enforce Safety Laws

By John J. McSherry

Factory Inspector, New York City

Proceedings of Second New York Industrial Safety Congress

THE inspector must be able to draw from a vast fund of knowledge and experience. He covers a broad and varied field and must possess the necessary technical and general knowledge to cover this field thoroughly.

His duties require him to be a safety, fire prevention, building, sanitary and elevator inspector. In addition he must be a fair draftsman. He must be observing, alert, tactful and courteous, and be able to impress the manufacturer by logical reasoning that the laws he is enforcing are not only for the benefit of his employes, but that a satisfactory compliance with same will materially reduce the cost of the employer's insurance, as well as promote the general efficiency of the working force of his plant.

PROTECTION AGAINST FIRE PERILS

In guarding workers against fires the inspector's duties require him to pay strict attention to the application and compliance with the laws for fire prevention, as well as those for fire protection.

In order to prevent fires the inspector must see that the floors, stairs and halls, as well as areas of buildings are kept clean and free from all rubbish. A lighted match or cigarette dropped through a grating over an areaway filled with paper and rubbish will soon start a blaze of considerable size. He must see that unused and vacant lofts are kept in a clean condition. He must see that waste is removed from floors of workrooms at least twice each day and deposited in properly covered fireproof receptacles, and that such waste is taken from all floors of the building each day, unless baled and stored in a fireproof enclosure. He must pay strict attention to the proper storage of combustibles used in the various industries. The Labor Law and Industrial Code state specifically what will be accepted for fire protection in buildings. The Inspection Bureau is charged with the enforcement of the laws and code regulations.

The inspector must order fire drills to be conducted in all factory buildings where the occupancy exceeds 25 persons above the ground floor, and he is also required to see that a fire alarm signal system is installed in such buildings over 2 stories in height, unless every square foot of the floor area on each floor is protected by an automatic sprinkler system.

INSPECTOR MUST BE A STUDENT OF ACCIDENT CAUSES

A standard code for the safeguarding of dangerous machinery is now being prepared by the State Industrial Commission. The inspector must know the hazards of the rolling mill, machine shop, woodworking shop, printing and binding shop, metal stamping, paper box factory, textile mill and of the various other industries. He must be a student of accident causes, because this is the only way to find out where and why accidents occur and how they may be prevented. He must be a practical safety man, familiar with electrical hazards and the best and most effective safety appliances and methods in general use for the prevention of injuries on and around dangerous machinery. He must see that all machines, machinery, apparatus, furniture and fixtures shall be so placed and guarded in relation to one another as to be safe from all persons. He is empowered to tag, as unsafe, dangerous machinery. He must see that the passageways around machinery and other unsafe places are properly lighted, that workroom floors are kept free from protruding nails, splinters, holes or loose boards, that passageways are not used as storage places and that stock and storage shelves are so constructed and sup-

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ported that they will safely carry the load placed on them in order to protect the persons passing or working under them.

We have learned by experience that an unsafe ladder means a serious injury or perhaps the loss of life. No such precaution seems to be taken in regard to ladders used in our factories. Our inspectors are constantly issuing directions to prohibit the use of defective and unsafe ladders in factories and workshops.

The Inspection Bureau finds it difficult to persuade a certain class of employers of the necessity of providing and maintaining a "First Aid Kit" on their premises. There were 328,632 industrial injuries reported to the Industrial Commission for the fiscal year 1916 and 1917. In approximately 49,000 of these injuries, infection made the result more serious, in many cases causing the loss of fingers, arms, legs, and in some instances resulted in death.

SANITARY CONDITIONS.

It is the duty of the inspectors to protect the health of factory workers who spend a great part of their lives in the factory or mercantile establishments and the sanitary condition of the places in which they work is of the greatest importance to their health and efficiency. The New York State Industrial Commission has adopted sanitary rules and regulations for factories and mercantile establishments and also regulations providing for the removal of dust, gases, fumes, excessive heat and other impurities from factory workrooms. The Inspection Bureau is charged with the enforcement of these rules and regulations, and in order to enforce them and secure a proper compliance, the inspector must be a practical sanitarian. He must see that a sufficient supply of clean, cold and pure drinking water is provided in each factory workroom, that ample wash rooms, urinals and water closets conveniently located, are provided for use of employes and that these are kept in a proper and sanitary condition.

In manufacturing establishments where wet processes are used, he must see that the floors shall be drained free from liquids and that dry standing platforms are provided for the employes. He must see that the general plumbing of the entire premises is kept in good repair and maintained in a sanitary condition. He must see that workrooms are kept well ventilated and lighted; that the floors of workrooms are kept in a clean condition and that covered sanitary receptacles are provided in each workroom for the storage of garbage and refuse. He must see that the walls and ceiling of workrooms are either limewashed or painted with light colored paint, that ample and properly ventilated dressing rooms are provided for female workers, and that couches or beds are provided in the emergency sick room for females.

He must also see that females employed in factories and mercantile establishments, or as waitresses in hotels or restaurants are provided with comfortable seats and that the use of such seats is permitted to such an extent as may be reasonable for the preservation of their health.

HEAT, DUST, FUMES, GASES

Industrial history has proven the dangers to the health of workers in industries where excessive heat, dust, fumes, gases and other impurities are produced in the process of manufacturing. These dangers can be completely removed by the installation and operation of efficient mechanical exhaust systems. The inspector must be able to draw from a vast fund of knowledge and experience relative to injurious and harmful occupations and industries. He must know what is injurious to health in the manufacture of thermometers and barometers, in the stereotype and electrotype foundries, the printing shop, the buffing, the grinding and plating trades, the brush factory, pearl button industry, fur trade and the various other industries too numerous to mention, where dust, fumes, gases and other impurities are located. The inspector must possess the proper engineering knowledge and skill to devise a mechanical system of ventilation which will enable the factory proprietors in these injurious trades to comply with the law.

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The Compensation Law and Syphilis

By C. P. Henry

Surgeon to The Carpenter Steel Company, Reading, Pa.

IT is not the purpose of this paper to go into the diagnosis of syphilis in its many forms, nor to discuss the treatment of the same.

The writing of this paper was prompted by the observation of several accident cases in which convalescence was abnormally prolonged due to the presence of syphilis in the body. The insurance carriers have been compelled to pay an unusually large amount of money for compensation and for treatment before the man was able to return to work.

I will endeavor to show that the company not only paid for the result of the accident, but also was compelled to pay for a disease which the man did not contract in the course of his employment. In not taking this fact into consideration the law is working a hardship and injustice on the insurance carrier.

The Wassermann reaction is a scientific and medically recognized method of detecting syphilis in the body, whether the infection has been present 6 weeks or 40 years. By taking blood specimens of the patients in the general wards, who are there for every conceivable ailment, as cardiac disease, kidney disease, fractured bones, etc., the percentage of patients showing syphilis by the Wassermann reaction averages 33 per cent.

Granted, that as in the wards you find the lowest class of society, you would expect to find the largest number of syphilitics, we must remember that there are also some fairly decent members of society in the general wards, who cannot afford the private ward and private rooms. Therefore, to be conservative, we will say that 15 per cent of the population has syphilis in some form, that is, roughly speaking, one in every six. If a company is employing 2,400 men, 400 of them have syphilis. It can be easily seen that syphilis is an important factor when compensation is considered.

It is a well-known medical fact that after the first invasion and overwhelming of the body by the spirochaeta of syphilis they are deposited in certain parts of the body, especially the brain, nervous system, tongue, skin and periosteum, where they remain latent for many years until awakened to activity through the irritation or excessive use of that part of the body. A slight blow or squeeze may induce the formation of a gumma in the bones or testicles and bones near the surface, as the tibia, ribs or skull are more apt to be affected by periostitis than the bones which are abundantly covered by a thick cushion of muscle and fat. Or the bones may be attacked by a form of rarification so that they easily fracture or gumma may form in their substance with resulting necrosis; or a bone being fractured in a person with syphilis may refuse to unite and we have an un-united fracture and a permanent cripple for the insurance carrier to deal with.

Two cases I wish to cite as examples of these conditions:

Case 1. A heavy man turned his ankle in making a misstep. Was sent to the hospital. X-ray was negative. Diagnosis sprained ankle. Ordinary time for recovery 4 to 6 weeks. This man was compensated by the insurance carrier for 7 months before he was able to return to work. He had latent syphilis, Wassermann + + + The slight injury stirred up this syphilis and a tarsal bone started a necrosis. This man, on account of his syphilis not acquired in the course of his employment, cost the insurance carrier $336. If he had not had syphilis and his disability had lasted 6 weeks, the cost would have been at the most $72.16.

Case 2. An Italian during his work suffered a fracture of the lower third of femur. One year had elapsed since the accident and the man has at present an un-united fracture and goes around on crutches. For one year the insurance company has been paying him compen-

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sation and his first two weeks' medical service. I have not the exact figures on this case, but they cannot pay him less than $5 a week, according to law, hence the minimum paid to date would be $260, plus a two-weeks' hospital bill. If the company could stop paying now it would have done its full duty, for in one whole year a fractured femur should be united and the patient back at work. But he is not at work, and the chances are very much against his ever recovering sufficiently to work, hence the insurance company must continue paying him compensation.

Such cases force the insurance companies to pay for the treatment of the men's syphilis. In other words, they must pay for a condition not contracted on the company's premises, nor in the course of employment.

What we wish to call attention to in this paper is that in case of an injury occurring in the presence of syphilis, the insurance company should pay for the time during which such an injury *ordinarily* takes to recover, and should *not* be compelled to pay for a disease which the man has acquired or inherited previous to his accident.

When Does Your Oiler Do His Work?

The employer of this oiler allowed him to do his work while the machinery was in motion. Result: A maimed workman and heavy compensation. Hundreds of similar injuries occur every year. Every shop should adopt and enforce a safety rule prohibiting oiling while machinery is moving.

(National Safety Council, Chicago.)

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 343 VARIOUS INDUSTRIES. — SAFETY SUPPLY SYSTEM.— During the past few years in the mills throughout the country a system to govern the distribution of safety supplies to employes and to keep a record of them has been more or less a failure in the opinion of the writer. Some companies have lost hundreds of dollars on account of employes leaving their employment and taking with them such safety supplies as had been given them by their employer. This in spite of the fact that the employer had the welfare of the employe at heart and was doing everything possible to protect him from injury.

In our plant, recently, we have installed a system to govern this that is simple and all that is necessary to accomplish the desired results along this line.

Our safety inspector has full charge of distributing and handling safety supplies. When an employe is in need of such supplies, same must be gotten from him through a requisition that has been signed by his foreman, and in no case are safety supplies given out unless the proper requisition is handed in to the safety department.

Employe's name and check number must appear on each requisition and, when it is received by the safety department, supplies are given the employe and a charge card is made out against him. The charge card is made up as per form shown below.

After the charge card is made out, the right hand part is sent to the department in which the employe works and is filed there. The other part is filed by the safety department.

In case of an employe leaving his department, the safety supplies, together with the charge card, must be sent by his foreman to the safety department. The safety department will then remove his card from its file and place the supplies back in stock. When placing supplies back in stock same should be thoroughly sterilized and examined for defects.

Date ..... Dept.	Date ..... Dept. .....
SAFETY INSPECTOR:	Name ..... Check No.....
Please furnish (name).....	Has been charged with.....
Check No. .....with	.....
.....	Same must be taken from him if he leaves your department.
.....	.....
Foreman	

With this system in effect the company may furnish its employes with safety supplies without loss.

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No. 344 ALL INDUSTRIES.—THE MAN ON THE JOB.—"The Man On The Job" is the only man who can prevent accidents. The safety inspector or safety committee may bring to his attention causes of accidents that have occurred in his line of work and may devise safety devices and appliances to guard the dangerous points about his working place, but in the end

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it all comes back to the attitude of 'The Man On The Job" toward accident prevention. If he is on the alert and careful to prevent injury to himself and his fellow workmen, all is well and good, and the number of accidents will be small. On the other hand, if he is careless, thoughtless and inclined to take chances, the number of accidents will be in direct proportion to the chances he takes. Because a man has habitually taken a chance and performed his work in a manner that does not agree with safe practices is no reason for him to believe that he can continue to take that chance and escape injury. The very next time he takes that chance may be the time that the accident will happen.

To educate the men to the point where it becomes a habit for them to perform their work in a safe manner is the ambition and goal of every safety man. With this idea in view we hold first aid classes at each of our plants once a month. The men are always interested in first aid work and it is used as an incentive to get them to attend these meetings.

Before beginning the first aid practice, the men are given a short talk on safety work. The accidents of the past month are reviewed and the men are asked for suggestions that will prevent a repetition of these accidents. As these first aid classes consist chiefly of foremen and others, whose work brings them in contact with workmen in all parts of the plant, their attitude toward accident prevention naturally has considerable effect on the other men. The open discussion of the accidents leads the men to realize how easily an accident may happen. Every effort is made to have the men understand that while it is well to know how to perform first aid for an injured man, it is much better to prevent the accident, so that first aid will not be necessary.

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No. 345 CHEMICAL INDUSTRIES. — There are numerous articles written on ways and means of decreasing accidents in our varied industrial plants throughout the country, but it is noted that very little has been said regarding safety work which has been undertaken by plants in the chemical industry. I would cite one instance of this kind which by systematic prevention measures has curtailed its accidents to a very low percentage.

It must be kept in mind that considerable expansion has taken place in the chemical and allied manufacturing branches during the past four years, and that men previously trained for other classes of work were called upon to enter this field. It was noticed shortly after the influx of untrained men into the work that the previous good standing of plants along safety lines was being affected through ignorance or carelessness, principally on the part of newly hired men. Accordingly all men were carefully instructed by their superiors before being placed to work. Our plant, like many others, found that many employes receiving very slight injuries neglected to report them, preferring to make use of the department first aid cabinet. Not having received proper attention, infection or other complications might possibly develop and they would then report for medical attention. Incidents of this kind often proved costly to the employe through loss of time and to the company on account of losing the services of an experienced operator. To prevent this practice the first aid cabinets were left intact with the exception that all bandages were removed. All cases were thereafter attended to at a centrally located first aid station, where proper reports were kept in detail.

A safety committee composed of four department heads was then appointed, it being their duty to make weekly inspections throughout the plant and report regularly recommendations and bad practice which reached their attention directly or through reports of subordinates to them. Memorandums of all recommendations for betterments suggested by the committee were promptly sent to the head of the department interested, and where it was of general interest, circular memoranda were distributed to all de-

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partments. The committee is advised through a safety inspector of any notices not acted on by the manufacturing department, and another memorandum marked "second notice" is sent if necessary.

In conjunction with this, boards holding weekly bulletins of the National Safety Council and other interesting circulars are displayed in prominent parts of the plant. In order to study the results of their work as well as to produce enthusiastic effort an accident avoidance report is made up monthly giving percentage of avoidance based on man-hours lost compared to man-hours worked in each department. In this report is also embodied the cause of each accident, which is discussed with the department heads, and wherever possible a remedy applied to prevent recurrence. With the above procedure our accident avoidance report percentage has climbed continually until last month 100 per cent was attained. The writer feels that the same good results may be attained by other plant safety organizations, working faithfully and having the co-operation of the management and men.

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No. 346 ALL INDUSTRIES — HOW TO PREVENT ACCIDENTS.—Accident prevention is one of the complex questions that is engaging the greatest minds of the country today, and is the vital question with the manufacturer.

How best to prevent accidents, in the easiest and most practical way, is up to The Man On The Job, and the greatest number of men we can engage in the safety movement in the factory is the solution to the question.

At present we have two very effective ways of reaching our employes: These may be grouped under one head —namely, the personal touch of the individual employe. We reach him by the bulletin boards, and by the personal touch of the safety factory chairman's daily inspection rounds. Every day both morning and evening I make a round throughout the entire plant, and look for unsafe practices, and also for any condition that may have been brought about that has left any machine unguarded, or for a bad plank in the floor, or any nails or overhead shafting or dangerously piled material, many times stopping to speak with the foremen, and also the men, relative to safety, and the men have learned that I am always glad to stop and hear any suggestions on safety that they may wish to give. This has proven effective, and has cut our number of accidents, and shows a remarkable interest among our employes.

The co-operation of the safety committee is just like one great unit, and we are getting results!

Another way we have is by giving the men something "hot" on the bulletin boards. By this I mean, when a man who has been wearing goggles has them cracked by a chip, or other object (which frequently happens), we post this item, telling how the goggles have saved John Smith, or whoever the employe may be, and in what department he works. Also, when an accident happens we frequently take a photograph and post it, telling how the accident happened, and how it could have been prevented. For instance, a few weeks ago a man was injured, because his sleeve caught in the drill. This could not have happened if his sleeve had not been down. Still another way is through our physical examination of new employes. We cause every man to feel that we are personally interested in his safety, and we explain the dangers of the department in which he is to work. In this way we get in touch with every man before he starts to work.

Our motto is personal touch with every man, and our slogan, "Every man a safe man."

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No. 347 ALL INDUSTRIES — A NOVEL SUGGESTION.—The Man On The Job discussions seem to offer something worthy of thought each month, regardless of some repetition. According to most of the safety inspectors, and with much truth, an ac-

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cident in the true sense of the word seldom happens, most of the so-called accidents being the results of preventable incidents and, therefore, not accidents.

To educate a man to look out for himself, the first step is to teach him to look out for the care and safety of others. A thought occurred to me while reading in your magazine the article, "Training for the Girls," especially the science of home-making.

The science of home-making should be the study of all employers. Making encouragement to men to start a home of their own by marrying one of the aforesaid girls, which is the best education in domestic science, and giving the man a partner whom it would be his ardent desire to protect and to afford continued comfort to, would be a special incentive to thoughtfulness, to see that he does not do any rash act and thereby make himself a burden instead of a solace to the one he loved, his real partner in life. In turn she would advise and warn him to be watchful and care for his domestic welfare, thus making him a more able man, a more useful citizen in his community, and a more valuable employe.

The aforesaid encouragement could be in the form of a bonus that would help to furnish the new home; also a further bonus at the first increase of their family.

This in my belief would be the greatest and most far-reaching measure ever put over.

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No. 348 VARIOUS INDUSTRIES—SAFE PILING OF MATERIAL AND TRACK CLEARANCES.—*Piling Rolls and Pinions.*—When it is necessary to pile rolls, they should not be piled more than three tiers high, unless in racks. Each roll or pinion in the bottom tier shall be securely blocked. If rolls of different lengths are in the same pile, then the longer rolls shall be placed under the shorter rolls. Do not pile rolls against the walls too weak to bear the pressure.

Piling or Loading Material on Cars.—The weight of the load must be properly distributed, and large pieces braced to prevent shifting. Do not allow material to project over the sides of the car, nor must it be so piled that there is a possibility of its falling off in transit. Rolls or pinions loaded on cars shall not be piled on one another in such a manner that there will be more than two rows on one car.

Piling Ingots, Moulds, Etc.—When piling moulds, the pile should not exceed five moulds high. Each tier should contain one less than the tier below. Each tier shall be blocked to make the pile secure. Moulds with butts or stickers, or any unevenness of bottom shall be left in a vertical position on the ground. Where space permits, the ingots shall not be left standing in a vertical position unless proper barrier or supports are provided.

Piling Bars, Slabs, Billets, Etc.—Bars, slabs, billets, etc., must be safely piled and not over seven feet high. The proper number of blocks should be used on each layer, and the blocking should be laid level on solid ground, and strong enough to sustain the weight of the pile. Allow sufficient space between each bundle, slab, etc., for the proper and safe attachment of chains, to prevent the possibility of a second bundle or bar being caught with the one intended to be moved. No loads should be lifted if it is held by only one chain, and all persons should be in the clear before material is lifted or moved. Chains, cables, slings, hooks, etc., to be in proper condition and of sufficient size and strength to do the work required of them. Any that are found defective must be replaced immediately. Periodical inspections should be made of all chains, cables, etc.

Track Clearances—Scaffolds or building should not be erected nor material piled within 4 feet 8 inches from the outside of standard or narrow gauge rails, so as to allow proper clearance for men alongside of cars.

Do not pile nor place any obstruction within 15 feet of fire plugs, hose houses or hose boxes, so that in case of fire the apparatus may be quickly reached.

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No. 349 ALL INDUSTRIES—"GETTING THE RIGHT MAN ON THE JOB."—When an ordinary machine is out of repair, common sense is used in selecting a machinist to make repairs. If the machine is a dynamo, we put an electric engineer on the job. If an automobile engine is out of repair we send for a man with a trained knowledge and experience in the design or construction of that particular type of engine. When the water pipes freeze and break, or spring a leak, we send for the plumber or steamfitter, but when the human machine, the highest type of any combination of mechanism for utilizing or applying power ever constructed, gets out of order we ask a neighbor, a relative, and even the office clerks, for advice until discomfort, distress, pain and suffering finally drives us to the man trained and experienced in repairing the human machine—the physician and surgeon—who is expected to get right on the job and undo all the harm that our procrastination has wrought. It is up to the doctor to clean out our ashes, to take care of our filtration plant, the kidneys, and to be on the job and keep the heart hitting on all cylinders.

Ask anybody and he will tell you of something, or how to mix a concoction that is "good for a cold," a "sore eye," "misery in the back," "stiff neck," or any other ailment the human machine is suffering. Some of this knowledge, however, is not valueless, but for the proper use of most of the remedies "Uncle Bill" or "Aunt Mary" suggests there is need of more discrimination than is commonly possessed. Treatment to many persons that is commendable in itself becomes quite contrary to others unless incidental risks are understood and guarded against. Many machines may be foolproof, but this is not so with the human machine. It is true, the human machine has its safety valves, governors and carbureters that allow for too much steam, for gluttony, ill treatment of the body, poisoning or flooding the carbureters, for infection, and for various other strains and stresses, just as every other well built machine is designed and constructed to withstand wear and tear and abuse that it is called upon to take care of in daily use. But these safety valves and other parts get out of order, repairs and adjustments must be made from time to time, and the man who doctors himself or follows the advice of a person who has no training or experience in the art of medicine and surgery is unwise.

When a real doctor is ill he realizes that he is not in a condition to take care of his machine and he gets another doctor on the job. This doctor looks the machine over—inquires about the gas, the food; examines the batteries, the nervous system; considers the engine that forces the steam or blood through the pipes, the arteries. If the pipes are overstrained they will deteriorate and burst, causing death by apoplexy. When the doctor has inspected the human machine and detected changes in the working parts, he orders repairs, or, perhaps, the human machine requires regulating. Adjustments of the human machine from a low speed to a high speed by a man other than a trained and experienced man, a physician, means giving the machine the wrong kind of work, operating with the wrong fuel, and this causes an early and inevitable breakdown. Use common sense in selecting the repair man for the human machine. Put the right man on the job, and keep him there to have your machine regularly inspected, oiled and cleaned. This will produce efficiency, avoid waste of precious time, difficult repairs to the human machine and will keep you from drifting into the most serious kind of trouble, ill health, with its miserable limitations on activity, achievement and happiness. Take your body to a physician's office, the "service station," when the machine needs looking over, and you will be sure to get the right man on the job.

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Prizes for March Articles

First Prize. No. 339. Elsor Heater, Assistant Safety Engineer, American Rolling Mill Company, Middletown, Ohio.

Second Prize. No. 341. W. N. Lipscomb, Field Representative, American Red Cross, Washington, D. C.

Honorable Mention. No. 340. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Another meritorious article was contributed by Fred C. Birkholtz, Jr., Safety Inspector, Thermoid Rubber Company, Trenton, N. J.

Comments by Members of the Committee

I vote for 339. While I do not believe a selling campaign to be, eventually, the most efficacious, yet until a safety engineer has sufficient backing from the head of his company he is *limited* to "selling safety."

I would say that if a system allows a non-believer to tear down or leave off guards, which were put up without his own approval, the fault is certainly not in the guard nor in the manner in which it was installed. The system, itself, is rotten.

Whenever safety outgrows the novelty stage—which it occupies in the minds of a great many employers—it will not be possible for the individual department head to take action along anti-safety lines that he now does and which he would never dare take on a straight operating proposition.

The writer of No. 339 has my sincere sympathy. I admire him for sticking up for his "selling campaign." It certainly beats inertia. But an unsafe condition, which could be remedied mechanically speaks louder than magazines, sign boards and bulletins combined.

No. 340 emphasizes a matter of great importance in many industrial plants. It is one that frequently receives scant attention, even where safety work otherwise is well carried out. Unfortunately there is, not infrequently, a feeling on the part of industrial system employes that they have a right of way and it is up to every one else to look out for themselves. This is a serious question in plants where unloading of cars and car-spotting are necessarily carried on practically simultaneously. It should be remembered that men in cars (box or dump), moving or shovelling material, frequently do not hear warning signals well; also that various conditions often compel moving material across industrial tracks by methods that prevent hurrying up when a locomotive is approaching.

An instance of disregard for the safety of fellow employes which has come under the observation of the writer on several occasions might be referred to here. At the starting point of a rather heavy grade in an industrial system, occurring just before a curve which hides the locomotive, a derail switch has been installed. Orders call for the locomotive to be brought to a standstill here and the switch thrown, thus giving an opportunity to make sure that the line ahead is clear and to prevent too great a momentum being gained. Occasionally a man will jump off the electric locomotive and make a dash to throw the switch without stopping the locomotive. The danger to the locomotive and crew and to others on the down grade, can easily be seen. This practice is in spite of instructions to the crews informing them of the object of the switch.

I cast my vote for article 340. It is brief and to the point, especially the section which deals with cleaning hands with gasolene and inflammable oils.

Article 341 gives a lot of useful information regarding the best methods for treating wounds after an accident. This is very valuable to the first aid man and hospital attendant, but as our main object, on the job, is the prevention of accidents—prevention is better than cure—my choice is article 339, because the information given contains splendid ideas for the education of foremen and workmen for the prevention of accidents.

I believe that if more were said about treating first-hand accidents, as the writer describes in article 341, it would be interesting and a great asset to SAFETY ENGINEERING. The teaching I received on first aid treatment, when connected with the Navy during the Spanish American War, I have never forgotten, and have used it on several occasions.

Article 339 presents a method of applying safety work, which, it seems, should tend to give the individual approached by the safety inspector an air of having had his individuality recognized. The "smart Aleck" may try to make little of such an attitude on the part of the inspector, but the "smart Aleck" is very much in the minority nowadays.

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Promptness and Knowledge in Rendering First Aid

By John L. Boardman

Bureau of Safety, Anaconda Copper Mining Company.

THE tendency toward bringing injured men to the surface before giving them first aid treatment has been increasing lately, but no particular cause can be found for this bad practice.

First aid to the injured is the first assistance that an injured man receives, and is given primarily to avoid subjecting the injured man to further danger, and secondarily to accord convenience in handling the injured man.

Look back at the accidents you have witnessed, and at the times you have assisted injured men to reach the surface, and recall the appearance of the wreckage, etc., the darkness and dirt, the difficulty you had in helping the injured, and most of all, how you hurt him in trying to help him.

Contrast your experience along this line with what you might have done if you had known just what to do at the time.

AN ILLUSTRATION.

Take this case for illustration: A man has both legs broken below the knees. He is in a stope seven floors above the sill. You can see that he is suffering intense pain, you know that if the broken bones pierce the skin he may lose his leg as a result, or if the sharp, broken bones cut the artery he may bleed to death. The problem is: How are you going to get that man out without causing him intense pain and danger? Or take a simple and much less complicated problem: Suppose a man receives a cut hand. The bleeding is not serious, he does not suffer much pain, he is apparently in no danger, and you probably think he had better go on top and have his wound dressed. *Do you know that he may touch a hundred things on his way out which would put such germs into that small wound as to cause the loss of the hand?*

Let us reason this out. First we know that you will not be able to help a man according to rule because there is no rule to designate where and how this man is to be injured. Therefore you will be obliged to use your judgment, but isn't it reasonable to suppose that your judgment will be clearer and better if you know how to find out what ails your patient, where the danger is and to what extent he has suffered? In recalling the injuries in which you have assisted, did you ever wish that you had known just a little more about it at that time?

LEARN FIRST AID.

Do you know that in five lessons of three hours each you can learn the essentials of the most up-to-date and approved methods for helping injured persons?

Now isn't it reasonable, since this can be done so easily, to say that every man connected with mining should learn First Aid, and then after he has learned it that he should be sure to apply it at the time and place of the accident, instead of sending injured men to the surface without any attempt being made to put them in a safe and convenient position to make the trip to the surface and hospital?

Think it over.

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Motion Picture Machine Operation

Adopted by the Industrial Board, Pennsylvania Department of Labor & Industry

In effect March 1, 1918

THE following safety standards have been adopted by the Industrial Board, Pennsylvania Department of Labor & Industry, subject to the provisions of Pennsylvania law:

OPERATION OF MOTION PICTURE MACHINES USING INFLAMMABLE FILMS

The word "shall" where used is to be understood as mandatory and "should" as advisory. Caution:—Employes shall not remove or make ineffective any safeguards while the same are in use, except for the purpose of making repairs, and such safeguards so removed shall be replaced.

SECTION 1. No motion picture machine using inflammable films shall be operated at any gathering or assembly of persons in this State unless the operator of the machine is at least 18 years of age, and is an operator licensed as hereinafter described in Section 2.

Any person under 18 years of age and over 16 years of age, who prior to the time of the enactment of this standard has been engaged for at least one year in the projection of motion pictures, shall be granted an operator's license, if after special inquiry and examination by the examining committee they are assured he is entirely competent.

SECTION 2. An operator shall be considered as licensed—

(a) If he holds a license from a local board or bureau created by law or ordinance to issue such licenses for the particular town in which he operates.

(b) If he has made application to the Department of Labor & Industry for a license, and has been granted such license after having passed a satisfactory examination.

SECTION 3. Whenever an operator is engaged in projecting motion pictures before an audience, he shall have his license displayed prominently in the booth so that it may be available for examination by the proper authorities. If a local ordinance covers the display of a license in any other suitable manner, the local ordinance shall govern.

SECTION 4. No person under 18 years of age shall be allowed in any motion picture booth during the time motion pictures are being projected from that booth before an audience, except those over the age of 16 years, employed as an assistant to the operator, or rewinder, and who shall hold an apprentice's certificate granted by a local board, or bureau created by law or ordinance to license operators, or by the State Department of Labor & Industry.

No operator shall allow any other person to be present in the booth during this period unless he has necessary business to transact, and in such an instance the latter shall retire from the booth immediately upon the conclusion of such business.

SECTION 5. The following rules and regulations shall be observed by all licensed operators, and for violation of any of them their license may be suspended or revoked:

(1) The operator's license and a copy of these rules and regulations shall be displayed in a conspicuous place in the booth while the public is on, or has access to, the premises.

(2) The apparatus and its connections shall be tested by the operator prior to each performance. It is forbidden to remove or dismantle any safety device from the lamp or the machine, such as fire-shutter, film guards, films magazine, etc., during the projection of motion pictures. No apparatus with lamp served with oxyhydrogen or acetylene gas shall be operated.

(3) It is forbidden to overfuse

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circuits or to make any electrical connection not sanctioned by the National Electrical Code, or the Electric Code of the Pennsylvania Industrial Board.

(4) The operator shall report promptly to the management in writing every defect in the apparatus or its connections. No defective apparatus, or apparatus of a type not approved by the Industrial Board, shall be operated.

(5) Badly torn films shall not be used and their presence in the booth shall be reported to the management as soon as practicable. All films should be inspected before being used.

(6) The booth shall at all times be kept clean. No pieces of film or other loose combustible material shall be allowed to remain in the booth unless contained in a metal fireproof can with self-closing lid, as specified in the Pennsylvania law which reads as follows:

"Every moving-picture booth shall be provided with not less than one approved one-quart fire extinguisher of the pump type. There shall be provided also one 12-quart bucket of sand for each machine in the booth, and one small metal fireproof can with self-closing cover. The booth shall be kept free of loose ends or strips of film, paper, oil, rags, and all other rubbish. It shall be unlawful for any person to smoke or strike matches within the booth."

(7) The interior of the booth shall remain readily accessible to all authorized persons, and while the public is on, or has access to, the premises, the door of the booth shall be kept closed as specified in the Pennsylvania law (and by no other means) which reads as follows:

"The main door of the booth shall be provided with substantial spring hinges and heavy steel spring or springs, sufficient to keep door closed, and said door shall be kept closed at all times. The door frame shall be provided with a stop to prevent the door from swinging into the booth or injuring the hinges."

(8) No film other than that on the projecting machine and on the rewinder shall be exposed in the booth at the same time, as specified in the Pennsylvania law, which reads as follows:

"A separate fireproof metal case, made without solder, shall be provided for each individual film, and such film cases shall be tightly closed at all times. Each film shall be kept in one of such cases at all times, when the same is not in the magazine of the machine or in the process of rewinding."

(9) No smoking is permitted in the booth at any time.

(10) No match, fire, or open light of any kind shall be permitted in the booth while the public is on, or has access to, the premises, except for the purpose of making urgent repairs, at which time all exposed films shall be removed from the booth.

(11) Every film fire, together with the apparent cause thereof, shall be reported promptly by the operator, through the management, to the Department of Labor & Industry, Harrisburg.

(12) No person under the influence of liquor, or a habit forming drug, shall operate a motion picture machine, or be permitted inside the booth. The operator shall not leave the booth while a motion picture machine, under his control, is in operation.

(13) No person holding a license shall exchange it with or lend it to any other person.

(14) All requirements of Act No. 96, approved by the Governor on the 10th day of May, 1917, and commonly known as the Motion Picture Booth Act, shall be complied with. (Copies of this Act can be obtained upon application to the Department of Labor & Industry, Harrisburg.)

RULES AND REGULATIONS FOR THE EXAMINATION AND LICENSING OF APPLICANTS TO OPERATE MOTION PICTURE APPARATUS

(1) Applicants for an operator's license, or apprentice's certificate, shall fill out the prescribed form of application. Copies of these blank forms may be obtained from the Department of Labor & Industry, Harrisburg. Any

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false statement made on this application will result in the revocation of any license issued to the person making such false statement.

(2) Applicants who have complied with the provisions of the foregoing section will thereafter receive written notice of the time when and the place where they shall appear for examination. A written report of the result of the examination will be sent to each person presenting himself for examination.

(3) The examination shall be written, oral, and practical, at the discretion of the Industrial Board, and shall relate to the following subjects:

(a) The handling of the head, lamp, appliances, and wiring of the machine outfit in the booth.

(b) Practical testing for electrical defects in lamp and wiring in the booth.

(c) The use of various safety appliances, mechanical and electrical, in the booth.

(d) General precautions to be observed in operating motion picture apparatus and its connections.

(e) Projection.

Only those applicants who secure a mark of at least 70 per cent in the written examination shall be eligible for the practical examination.

(4) In case the Examining Committee is satisfied that an applicant's knowledge of the English language is insufficient to enable him to read the questions and to write his answers, the questions pertaining to the written examination may be read to him, and his answers thereto may be transcribed by some authorized person and placed on record.

(5) An applicant who has failed in either the written, oral, or practical part of his first examination shall not be eligible for re-examination in such part until after one month from the date of such failure. An applicant who has failed at any subsequent examination in either the written, oral or practical part shall not be further eligible for re-examination in such part until after six months from the date of such second or subsequent failure.

(6) Every application for renewal of a license shall be made within the 30 days preceding the expiration of such license.

(7) Licenses shall be renewed once each year.

Interesting the Older Men in "Safety First"

By Ralph C. Richards

Chairman of the Central Safety Committee of the Chicago & North Western Railway.

ONE way to get the active support and assistance of the older men is by appointing committees to investigate every accident. That is what the North Western tries to do. We have the men make an investigation entirely separate from any investigation that is made by the safety department, and their report is written out. I get a copy of it and it is posted on the bulletin board, so that every man in the shop will have an opportunity of knowing just how Jim Smith, who may live next door to him, got hurt, and whether it was Jim Smith's fault or whether it was the fault of somebody else, or the fault of the company. You would be surprised to know how many suggestions come with those reports. They are all made by the men who do the work, who are familiar with the way that work is and ought to be done. It gives the men courage, too, when they are asked to investigate those accidents and report just what they find regardless of connections. What we want is the truth so that we can prevent a repetition of the accident.

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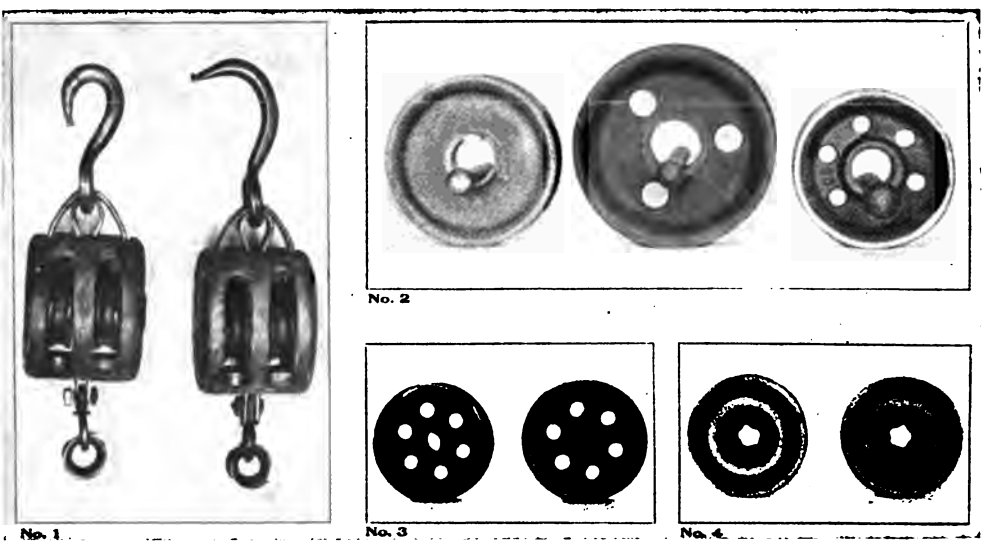
Another way of interesting the older men in the "Safety First" movement is to furnish them with the information as to how many accidents you have every month. Post it on your bulletin board, show whether you are having an increase or a decrease and they should also be furnished, it seems to me, with a monthly or semi-annual or annual statement of the causes of accidents.

Thousands and thousands of recommendations have been made by safety committees on the North Western, nearly all of which were proper and reasonable and represented matters of necessity and of right. During the last five years 24,164 recommendations were adopted and only 1,019 were rejected—a demonstration, I take it, not only of the reasonableness of these suggestions, for many of them were of a trifling nature, but a demonstration to the men that the North Western was sincere and was willing to do more than its share to carry out safety suggestions.

So I say again, it seems to me that it is essential that the men who are connected with the "Safety First" organization, as engineers, or inspectors, or supervisors, or whatever the nature may be, should see that reasonable and proper recommendations are complied with.

It is up to us to fight for them. It is up to us to demonstrate to the men that we are interested, and we want to do everything we can to carry the work along as they recommend it to us.

Pulley Blocks



No. 1

No. 2

No. 3

No. 4

Pacific Gas & Electric Company.

Picture No. 1 shows two pulley blocks; one with a hook that has been straightened out and driven back cold, thereby weakening the hook to an unknown degree; the other with a hook straightened out nearly to the letting go point, and likely to let a transformer, or other heavy object, fall on a workman.

Picture No. 2 shows pulley block sheaves and axle pins badly worn for want of oil. One of the pins is nearly worn in two.

Picture No. 3 shows a pulley block sheave and pin that have been kept oiled and are therefore not badly worn.

Picture No. 4 shows pulley block sheaves with roller bearings, a type of block that requires less oiling than the plain bearing.

Inspect your pulley blocks frequently to see that the sheaves and pins are not badly worn or the hooks straightened.

All plain bearing sheave wheels should be oiled every day they are in use on heavy work. The roller bearing sheaves should be oiled occasionally so as to reduce the friction wear and the danger of breaking. Oiling always lightens the work and makes it easier to judge the load and to keep within the capacity of the rope and blocks.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

APARTMENT HOUSES

February 6, 1918. Fort Payne, Ala. DeKalb hotel building. Galt avenue and Ford street. Apartment house. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, sparks from flue. Fire started in roof. Discovered by policeman about 10:30 p. m. Alarm, by policeman. Duration, 5 hours. Stopped when building was consumed. Fire was favored by all wood construction. Firemen handicapped by insufficient water pressure. Private fire apparatus, several extinguishers. Persons in building, 65 to 75. Means of escape, fire escapes. Value of building and contents, $40,000 to $50,000. Property loss, total.

February 20, 1918. Detroit, Mich. P. E. Davis. 3032-3034 East Grand Boulevard. Apartment dwelling. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, supposedly defective wiring. Fire started in basement. Discovered by janitor about 6 p. m. Alarm, telephone. Duration, 2½ hours. Stopped at ceiling of 3d story. Fire was favored by ventilating shaft in center of building. Persons in building, 7 families (exact number of persons not stated). Means of escape, inside stairway and rear balcony.

CHEMICAL AND PHARMACEUTICAL WORKS

January 28, 1918. Toledo, Ohio. Rex Spray Company. Nebraska avenue and Lake Shore Railway—just outside city limits. Chemicals. One 2-story building partially destroyed. Wall, brick and frame. Floors, wood. Roofs, wood. Cause, defective electric switch. Fire started in 2nd story—brick portion of building. Discovered by employe about 9:40 a. m. Alarm, telephone. Duration, 1½ hours. Stopped in same part of building—burned 2nd story and through roof. Firemen handicapped by long lines of hose, frozen hydrants, extreme cold weather and snowdrifts. Persons in building, 15. Means of escape, none. Value of building and contents, $42,000. Property loss, $30,000.

January 31, 1918. Andover, Mass. Beaver Chemical Manufacturing Company. Essex street. Manufacturing dyes. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, oil kettle boiled over on gas flame. Fire started in 1st story. Discovered by workmen about 10:23 a. m. Alarm, telephone. Duration 2½ hours. Stopped in building of origin. Fire was favored by wood construction. Firemen handicapped slightly by acid fumes. Private fire apparatus, 3 streams from Tyer Rubber Company. Persons in building, 5. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $19,000. Property loss, $9,000. Valuable papers were saved.

CHURCHES

February 1, 1918. St. Paul, Minn. St. Matthew's Lutheran Church. Dale and Sherburne avenue. One 1½-story church partially destroyed. Walls, brick. Floors, wood. Roofs, shingles. Cause, defective furnace pipe. Fire started in basement. Discovered by policeman about 1:33 a. m. Alarm, telephone. Duration, 1 hour. Stopped at rear of same building on roof. Fire was favored by frame interior and light furnishings. Persons in building, none. Means of escape, doors. Value of building and contents, $34,000. Property loss, $6,000.

COTTONSEED OIL MILLS

February 2, 1918. Birmingham, Ala. Union Cotton Oil Company. Fifth avenue and 46th street, North. Peanut and velvet beans mill. One-story warehouse and 3-story machinery building (connected by tunnel) destroyed. Walls, brick. Floors, wood. Roofs, warehouse, composition; machinery building, tar and gravel. Cause, unknown. Fire started in warehouse conveying tunnel. Discovered by watchman about 11:50 p. m. Alarm, telegraph. Duration, 6 hours. Confined to building. Fire was favored by open construction of building; also by the conveying tunnel through building. Firemen handicapped by distance to travel—about 1 mile from nearest station. Entire building in flames when first company arrived. Private fire apparatus, hydrants and hose in yard. Persons in building, 10. Injured, 1—

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sprained back in jumping from 2nd story. Means of escape, stairway. Value of building and contents, $372,000. Property loss, $300,000.

DEPARTMENT STORES

January 27, 1918. Guelph, Ont. G. P. Ryan & Co. 113-17 Upper Windham street. Dry goods. One 3-story building damaged. Walls, stone. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in basement. Discovered by policemen about 3:17 a. m. Alarm, telephone. Duration, 4 hours. Stopped in basement. Fire was retarded by fire wall. Firemen handicapped by poor water pressure. Persons in building, 50. Means of escape, stairway. Value of building and contents, $170,000. Valuable papers were all protected.

DWELLINGS, ORDINARY, CITY

February 6, 1918. Wilmington, Del. Dr. A. Robin. Corner 7th and Rodney streets. Dwelling. Owner, physician and chemist. One 3-story building destroyed. Walls, brick and stone. Floors, wood. Roofs, wood and slate. Cause, hot coals in wooden ash box. Fire started in basement. Discovered by crew of passing trolley car about 6:40 a. m. Alarm, regular system. Duration, 5 hours. Stopped when building was consumed. Fire was favored by chemicals of various kinds in laboratory. Firemen handicapped by frozen hydrants and low water pressure. Persons in building, 6 or 7. Means of escape, through 2nd story windows. Value of building and contents, $30,000. Property loss, total.

ELECTRIC TRACTION PROPERTIES

February 4, 1918. Wheeling, W. Va. West Penn Electric Company. Huron and Zane streets. Street car barns. One 1-story building destroyed. Walls, brick. Floors, wood. Roofs, wood covered with tar paper. Cause, overheated stove in street car. Fire started in south end of building. Discovered by employes in building about 2:10 a. m. Alarm, street box. Duration, 2 hours. Stopped in building of origin. Fire was favored by strong draft; both ends of the building were open. Firemen handicapped by nearly impassable streets on account of ice and snow, frozen fire plugs and low water pressure. Private fire apparatus, chemical extinguishers; also fire hose, but private fire plug was frozen and could not be used. Persons in building, 16. Injured, 1 fireman burned on arm and hands. Means of escape, ample; 1-story building only. Value of building and contents, $315,000. Property loss, $200,000.

FERTILIZER AND ACID PLANTS

January 27, 1918. Laurel, Miss. Laurel Oil & Fertilizer Manufacturing Company. Manufacturing cottonseed oil and fertilizer. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, sheet iron. Cause, unknown. Fire started in lint room. Discovered by watchman about 2:30 a. m. Alarm, telephone. Duration, under control in 4 hours. Stopped 1st story. Fire was favored by oil soaked floors and a stock of cottonseed meal cakes stored on ground floor. Private fire apparatus, mill's crew of firemen. Persons in building, watchman only. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $15,000.

GARAGES AND AUTO REPAIR SHOPS

February 6, 1918. Philipsburg, Pa. Pritchard's garage and livery stable. North First street. Two buildings destroyed and a third one partially destroyed; 1- and 2-story. Walls, brick and frame. Floors, wood and cement. Roofs, tar paper. Cause, unknown. Fire started in hay mow in 2nd story. Discovered by persons in office of garage about 9:15 p. m. Alarm, telephone. Duration, about 4 hours. Stopped at building adjoining garage. Fire was favored by wood construction. Private fire apparatus, hand chemicals, but they could not be used as fire was too far advanced when discovered. Persons in building, 3. Means of escape, doors to street. Value of buildings and contents, $125,000. Property loss, $15,000.

February 11, 1918. Rochester, N. Y. Electric Car Sales & Service Company. 745 Park avenue. Garage and salesroom. One 1-story building damaged. Walls, concrete. Floors, concrete. Roofs, wood, tar covering. Cause, unknown. Fire started inside building—rear of 1st story. Discovered by employes about 6:26 a. m. Alarm, telephone and Gamewell system. Stopped near point of origin. Fire was retarded by substantial construction. Persons in building, not stated. Means of escape, 1-story building only.

February 14, 1918. New Brunswick, N. J. Deangelis & McNally. 68-72 Albany street. Garage and automobile repairs. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, ruberoid. Cause, portable gasoline torch. Fire started in 1st story. Discovered by watchman about 6:30 a. m. Alarm, street boxes 47-49. Duration, 9 hours. Stopped at adjoining building. Fire was favored by frame construction. Persons in building, 10. Means of escape, none. Value of buildings and contents, $95,000. Property loss, total.

February 15, 1918. Gouverneur, N. Y. A. S. Whitney & Sons. John street. Garage. Three 1- and 2-story buildings destroyed. Walls, concrete blocks and wood. Floors, concrete and wood. Roofs, metal. Cause, probably overcharge of electricity. Fire started in garage. Discovered by seeing flames break through roof about 5:20 p. m Alarm, box. Duration, 2 hours. Stopped when buildings were consumed. Fire was

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favored by open space—no cross wall nor fire doors. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, approximately $75,000. Property loss, total.

GENERAL STORES

December 30, 1917. Troy, Vt. C. W. Seaver. Main street. General store and drug store. Two stores and a dwelling partially destroyed, 2½ stories. Walls, wood. Floors, wood. Roofs, wood. Cause, overheated furnace. Fire started in basement of general store. Discovered by neighbors about 6 a. m. Alarm, whistle. Duration, 2 hours. Stopped in the drug store and dwelling. Fire was favored by close proximity of buildings. Firemen handicapped by cold weather. Persons in building, 2 families in dwelling. Means of escape, ordinary doors. Value of buildings and contents, approximately $70,000. Property loss, about $18,000.

HOSPITALS AND SANITARIUMS

January 29, 1918. Kansas City, Kan. Grandview Sanitarium. Ridge avenue and 26th street. Sanitarium. One 3-story building partially destroyed. South wing was a total loss. Main building, or east and west wings, damaged slightly by fire below the 3rd story, also a water damage. Walls, brick, wood partitions. Floors, wood. Roofs, shingles. Cause, supposedly defective flue. Fire started in roof. Discovered by motorman of street car about 4 p. m. Alarm, telephone. Duration, about 4 hours. Stopped in 3rd story of main building. Fire was retarded by substantial outer walls. Firemen handicapped by great distance to fire plugs; nearest one about 750 feet away, and the next one about 750 feet beyond the first one. Private fire apparatus, small chemical extinguishers. Persons in building, about 25. Injured, 1. Means of escape, fire escapes and hallways. Value of buildings and contents, $33,000. Property loss, $13,500.

HOTELS AND LODGING HOUSES

February 1, 1918. Martinez, Cal. Fairview Hotel. Peyton road and Laguna street. One 2-story building destroyed. Walls, rustic wood and plaster. Floors, wood. Roofs, paper and gravel. Cause, explosion of defective oil stove. Fire started in lobby where oil stove was placed. Discovered by a guest in 2nd story about 1:31 a. m. Alarm, telephone. Duration, 2 hours. Stopped when building was consumed. Fire was favored by burning oil and strong wind. Firemen handicapped by distance to travel (1 mile from fire station), rapid headway of fire and poor water pressure. Private fire apparatus, 35-gallon chemical. Persons in building, 91. Killed, 2. Injured, 5. Means of escape, 2 stairways. Value of building and contents, $25,000. Property loss, total. Only salvage was the safe with its contents. Some guests and the owners of the hotel lost even their clothes.

February 5, 1918. Blue Point, L. I., N. Y. Hotel Warner. Blue Point avenue. Boarding house. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, unknown—mysterious fire. Fire started in 1st story at foot of stairs. Discovered by seeing smoke pouring out of building about 12:25 p. m. Alarm, fire department opposite the hotel. Duration, 2 hours. Stopped when building was consumed. Fire was favored by all wood construction. Persons in building, none. Injured, 1 fireman. Means of escape, fire escape. Value of building and contents, $10,000. Property loss, total.

IRON AND STEEL MILLS

February 19, 1918. East Chicago, Ind. Republic Iron & Steel Company. Chicago avenue. Iron and steel mill. One 1-story building slightly damaged. Walls, sheet iron. Floors, brick and iron. Roofs, sheet iron. Cause, boiler explosion. Fire did little damage to building and was extinguished with a few buckets of water. Alarm, telephone. Fire was retarded by metal construction of building. Private fire apparatus, fire plugs and hose at various locations. Persons in building, not reported. Killed, 3. Five other persons died in the hospital. Means of escape, ample; 1-story building only.

MERCANTILES, MISCELLANEOUS

February 18, 1918. Auburn, N. Y. H. R. Wait Furniture Company. 77 Genesee street. Dealers in furniture, carpets, drapery, etc. Part of one 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in sub-basement near elevator. Discovered by janitor about 6:25 p. m. Alarm, telephone. Duration, 3 hours. Stopped in 3rd story. Fire was favored as flames shot up elevator shaft in center of building, spreading through each floor. Firemen handicapped by electric wires in rear alley. Private fire apparatus, portable fire extinguishers. Persons in building, 1. Injured, 4 firemen overcome by smoke. Means of escape, stairways—no outside fire escapes. Property loss, $60,000.

February 19, 1918. Kansas City, Mo. Brady building. 1116-1118 Main street. Ladies' cloaks and suits and retail shoe store. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood and gravel and tar. Cause, unknown; suspected incendiarism. Fire started presumably on 1st floor. Discovered by citizen about 3:11 a. m. Alarm, telephone. Duration, 5 hours. Stopped at adjoining building. Fire was favored by wood floors and old-style construction. Private fire apparatus, 3-gallon chemicals. Persons in building, none. Killed, 1 fireman. Injured, 2 firemen. Means of escape, front stairway and rear fire escapes. Value of building and

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contents, estimated at $100,000. Property loss about $87,000.

MERCANTILES, TENANT BUILDINGS

January 30, 1918. Maryville, Mo. Townsend Grocery Company and other buildings. 420 North Main street. One 3-story and three 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 3rd story occupied by Masonic lodge. Discovered by odor of burning wood and investigation about 7 p. m. Alarm, regular system. Duration, 48 hours. Stopped at fire wall, 4 doors south of building of origin. Fire was spread by an explosion which blew out south wall of building; otherwise it could have been kept within the Townsend building. Firemen handicapped by poor water pressure and extreme cold—20 below zero. Private fire apparatus, hand extinguishers, which could not reach the blaze. Persons in building, about 20. Injured, 2. Means of escape, fire escapes. Value of buildings and contents, $150,000. Property loss, practically total. All valuable papers were saved.

February 16, 1918. Jacksonville, Fla. L. Engle building. Bay and Main streets. Furniture, drug and shoe stores. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, metal. Cause, unknown. Fire started in furniture store in rear of 3rd story. Discovered by citizen about 7:35 a. m. Alarm, telephone. Duration, 3 hours. Stopped in 3rd story of same building. Fire was favored by inflammable contents of building. Persons in building, not known. Means of escape, stairways. Value of building and contents, $125,000. Property loss, $62,000.

March 17, 1918. Johnstown, Pa. Several business buildings. Franklin and Vine streets. Electric fixtures, jeweler, women's furnishings and butter store. Six buildings destroyed, 2 to 6 stories. Walls, wood, stone and brick. Floors, wood. Roofs, tar paper. Cause, unknown. Fire started in rear of Rose building. Discovered by tenants in 2nd story about 2:55 a. m. Alarm, Gamewell system. Duration, about 14 hours. Stopped at Leader building. Fire was retarded by solid wall of Leader building. Firemen handicapped by dense smoke and low pressure on two hydrants. Private fire apparatus, few 3-gallon chemicals. Persons in buildings, about 60 in Rose and Lincoln buildings. Injured, about 12. Means of escape, stairway and fire escapes. Value of buildings and contents, $500,000.

METAL WORKERS

January 13, 1918. South San Francisco, Cal. E. H. Edwards Wire Works. Butler road. Wire mill. One 1-story building destroyed. Walls, sheet iron. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started around boiler. Discovered by watchman about 9:45 p. m. Alarm, telephone. Duration, 5 hours. Stopped when building was consumed. Fire was retarded by galvanized iron construction. Firemen handicapped by tardy alarm and lack of proper water connections. Private fire apparatus, two inside hydrants each with 75 feet of 2-inch hose, also hand fire extinguishers. None of this apparatus was used. Persons in building, 1. Means of escape, ample exits. Value of building and contents, $58,000. Property loss, about $50,000. Valuable papers and records were all saved.

OFFICE BUILDINGS

January 23, 1918. Flint, Mich. Michigan Light Company and Commonwealth Power Company. 127-129 East 1st street. Office building and stockrooms. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by smoke penetrating through walls to restaurant next door about 2 a. m. Alarm, telephone. Duration, 4 hours. Stopped at 1st floor. Fire was favored by wood in interior finish. Firemen handicapped by heavy girder, which ran around and projected below basement window openings. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $31,000. Property loss, $17,000. Papers of value were all protected.

PAINTS, OIL AND VARNISH STOCKS

February 17, 1918. Halifax, N. S. Martin Senour Paint Company. Water street, head of Furness-Whitney dock. Wholesale and retail paints and varnishes. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel composition. Cause, supposedly spontaneous combustion. Fire started in basement. Discovered by a passerby about 4:40 a. m. Alarm, box. Duration, 4 hours. Stopped when building was consumed. Fire was favored by inflammable stock in building, and open elevator shaft, up which fire went rapidly to roof, which soon collapsed. Firemen handicapped by cold weather and snowstorm. Persons in building, none. Means of escape, front doors and windows. Value of building and contents, $25,000 (building only). All papers, records, etc., were found intact as the office portion of the building was metal sheathed.

PRINTERS AND BOOKBINDERS

February 5, 1918. Monroe, Mich. Monroe *News-Courier*. 20-22 West 1st street. Newspaper plant. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Discovered by fireman walking past the building about 4:10 a. m. Alarm, fireman went to station ½ block away. Duration, 4 hours. Stopped in 1st story. Fire was retarded by prompt discovery. Firemen handicapped by extreme

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cold—20 below zero. Persons in building, none. Injured, 1 fireman. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $25,000. Property loss, $10,000.

February 5, 1918. Anaconda, Mont. Anaconda *Standard*. Third and Main streets. Publishing company. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started at bottom of elevator shaft. Discovered by employes about 10:50 p. m. Alarm, Gamewell system. Duration, 4 hours. Fire was favored by double roof and "fire-trap" construction. Building was 30 years old. Firemen handicapped by 60-mile wind. Persons in building, 30. Means of escape, stairs only. Value of building and contents, $143,000. Property loss, $78,000. Papers of value all kept in large safe.

SCHOOLS AND COLLEGES

February 6, 1918. Vanceburg, Ky. Glen Springs College. On country road, 12 miles from town. Baptist college and boarding school. One 3-story building destroyed. Walls, frame. Floors, wood. Cause, defective flue. Fire started in kitchen at breakfast time. Alarm, no fire department. Duration, burned all day. Stopped when building was consumed. Fire was favored by wood construction. Private fire apparatus, water buckets. Persons in building, about 50. Injured, 1. Means of escape, inside stairways. Value of building and contents, $75,000.

February 12, 1918. Birmingham, Ala. Central High School. Seventh avenue and 24th street, North. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, supposedly incendiary. Fire started in auditorium. Discovered by passing automobilists about 12:55 a. m. Alarm, telephone. Duration, nearly 8 hours. Fire was confined to building. Fire was favored by absence of any fire-stops; spread through doors and windows. Private fire apparatus, 2-inch standpipes. Persons in building, none. Means of escape, 4 fire escapes. Value of building and contents, $225,000. Property loss, $150,000. Valuable papers were protected.

TANNERIES

February 5, 1918. Ashland, Ky. Ashland Leather Company. 25th and 26th streets. Manufacturing leather. One 2-story building destroyed. Walls, wood and sheet iron. Floors, wood. Roofs, sheet iron. Cause, unknown. Fire started near center of building. Discovered about 8 a. m. Alarm, telephone. Duration, 10 hours, 15 minutes. Stopped when building was destroyed. Firemen handicapped by lack of water. Waterworks broken down. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $50,000. Property loss, $45,000.

TEXTILE MILLS

February 16, 1918. Marlboro, N. H. Valley Woolen Mills. East Main street. Manufacturing suitings, blanket cloths and mackinaw clothes. One 2½-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started between two nappies. Discovered by employes about 10:05 a. m. Alarm, telephone. Duration, about 6 hours. Stopped at same building where it started. Fire was favored by all wood construction. Private fire apparatus, two pumps at mill. Persons in building, about 50. Means of escape, fire escapes. Value of building and contents, $50,000. Property loss, total.

WAREHOUSES, PUBLIC STORES

February 8, 1918. Toledo, Ohio. Building owned by Quale estate. 238-244 Water street. Warehouse for National Biscuit Company and Nugent Furniture Company. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started inside building in 2nd story. Discovered by citizen about 6:24 a. m. Alarm, telephone. Duration, 3 hours. Stopped after burning through roof on part of the building. Fire was favored by wood construction. Firemen handicapped by extreme cold. This fire had a big start before it was discovered and followed immediately after another fire in the business district. Persons in building, none. Means of escape, none. Value of building and contents, $78,000. Property loss, $38,000.

KILLED AND INJURED IN FIRES

January 29, 1918. Kansas City, Mo. Grandview Sanitarium. One person injured.

January 30, 1918. Maryville, Mo. Townsend Grocery Company. Two persons injured.

February 1, 1918. Martinez, Cal. Fairview Hotel. Two persons killed, 5 others injured.

February 2, 1918. Birmingham, Ala. Union Cotton Oil Company. One person injured; sprained back in jumping from 2nd story.

February 4, 1918. Wheeling, W. Va. West Penn Electric Company, car barns. One fireman burned on arm and hands.

February 5, 1918. Monroe, Mich. Plant of Monroe *News-Courier*. One fireman injured.

February 5. 1918. Blue Point, L. I., N. Y. Hotel Warner. One fireman injured.

February 6, 1918. Vanceburg, Ky. Glen Springs College. One person injured.

February 18, 1918. Auburn, N. Y. H. R. Wait Furniture Company. Four firemen overcome by smoke.

February 19, 1918. East Chicago, Ind. Republic Iron & Steel Company. Three persons killed; 5 others died later in the hospital.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

SQUARE D SWITCHES

The Square D Company, formerly The Detroit Fuse and Manufacturing Co., Detroit, Michigan—a pioneer in the field of developing enclosed safety switches for preventing electric shock accidents in industrial plants—has recently issued a new catalog, Number 24, describing and enumerating the extensive line of Square D safety switches.

Today no one acquainted with the peculiar characteristics of electricity endorses the installation of open-knife switches. No industrial safety engineer will permit them for the reason that they are a dangerous hazard in industrial establishments. Many fatal and a very great number of serious accidents have been caused through industrial employes coming in contact with live current. It is now the universal opinion among industrial accident preventionists that the enclosed safety switch is a necessity and is the remedy for safeguarding against electric shock. It is but a few years ago that the enclosed safety switch was placed on the market and of course up to that time protected switches were a great rarity in industrial establishments, but in these few years there has sprung up a great demand for the enclosed safety switch and the demand is steadily increasing.

Enclosed safety switches are now found in industrial establishments throughout the country, especially where the importance of accident prevention measures is receiving most careful attention.

The Square D Company now confines itself exclusively to the production of safety switches, as this branch of the business of the Detroit Fuse and Manufacturing Company has grown to such proportions that the manufacture of other apparatus by the Square D Company has been abandoned.

The switch unit in Square D Steel Enclosed Switches is completely enclosed in a metal box provided with a hinged cover. The switch is operated by a handle on the outside of the box. A safety locking off feature prevents careless closing of the switch when any one is working on the line or the equipment controlled by the switch, thus protecting the operator while making repairs and inspections. Means are also provided to lock the cover shut to prevent unauthorized persons overfusing the switch or in any way tampering with the connections. The quick-break mechanism with which these switches are equipped is positive and insures a simultaneous break at all blades. Great durability is thus assured. The Square D Iron-clad Switches and Motor Starters have a quick-make and break mechanism enclosed in a cast iron housing. These switches are intended for service under severe conditions where they are exposed to water, steam, fumes, etc.

All Square D switches are examined and labeled under the direction of the Underwriters' Laboratories and were the first to bear the new combined fire and accident label of the Underwriters' Laboratories which carries with it the approval of the National Workmen's Compensation Service Bureau. A copy of the above-mentioned catalog will gladly be sent by the Square D Company, Detroit, Michigan.

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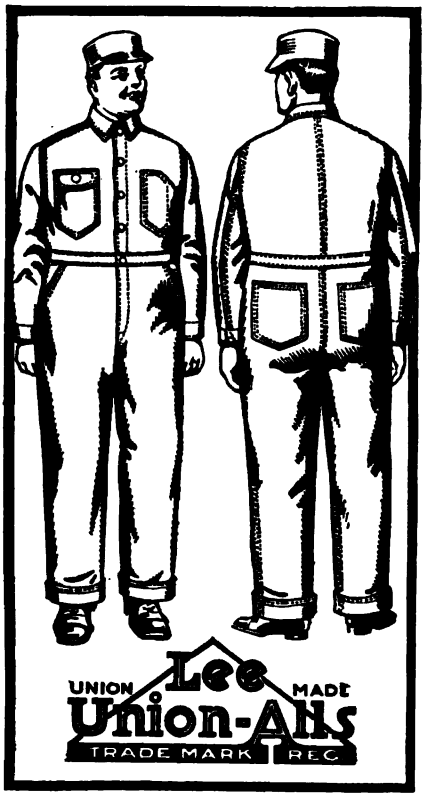
"SAFETY FIRST" AND THE ONE-PIECE WORK GARMENT



Although a rather late arrival in the field of safety first clothing, the one-piece work suit has met with almost universal approval, and, when we consider what an important part proper clothing plays in the prevention of accidents, it is hard to understand why industrial plant managers do not insist upon their employes wearing this modern, safety first garment.

Loose clothing is responsible for many serious accidents and deaths in manufacturing plants. Every set screw, every pulley, every belt, every gear, every revolving shaft, is a constant source of danger to the man who wears clothes with flapping ends or jacket tails. In spite of all the prescribed safeguards for machinery, these accidents occur. A loose shirt sleeve catches on a drill, a jacket tail is caught between gears or upon a revolving shaft, a broken suspender is caught by a fast whirling pulley, and in many cases the man is seriously injured and in some cases killed.

The one-piece suit does away with many possibilities for accidents. It has no suspenders, no flying jacket tails, no loose ends of any kind. The fact that some men stuff the tail of the jacket into the overall does not make them accident-proof as far as the jacket is concerned, for it is possible for the tail of the jacket to work out at the side of the overall and catch in moving machinery. Besides, when the jacket tails are stuffed into the overall, there is a bunchy, double thickness at the waist that is decidedly uncomfortable. And a workman who is uncomfortable is more liable to have an accident. The one-piece suit is the most comfortable kind of work clothing made. It allows free and unhampered movement of the body.

The one-piece work suit is most practical for women, too. It is the only safe garment for a woman who works about machinery of any kind. It does away with the time lost in "arranging" skirts and waists. Her work becomes easier and she is comfortably attired. When properly designed, this garment is not immodest at all, and in fact, gives a woman a neat, attractive appearance.

It should not be necessary for accidents to occur before the necessity for a safeguard is recognized. The question should not be "Has an accident ever occurred in such a manner on account of unsuitable clothing," but rather, "Could such an accident possibly happen because the workman was not properly clothed?" A man has but one life, two hands and two feet and the proper way to protect him is to think *before* the accident rather than after it. The one-piece work suit costs no more than the old fashioned kind and will protect the worker from those accidents which so frequently are caused by loose ends, suspenders, and jacket tails.

The H. D. Lee Mercantile Company—the manufacturer of Lee Union-Alls—recently has been featuring Lee Union-Alls as a safety first garment. Several full pages in the *Saturday Evening Post* have most strikingly presented these arguments. In 1913 only 1,416 Lee Union-Alls were sold, while in 1917 over 1,300,000 were sold. In three short years Lee Union-Alls have risen from obscurity to a very well-known position in the work garment business. Many of the biggest and best known manufacturing enterprises in the United States are clothing all their employes with Lee Union-Alls at their own expense or are strongly urging their men to so equip themselves.

The one-piece work garment supplies a long existing want. It is thoroughly practical, very comfortable, and above all, it prevents accidents.

FIRE EXTINGUISHER EFFICIENCY

Hand fire extinguishers are among the most valuable means for extinguishing fires in early stages, and that is their purpose. Unquestionably a large number of fires could be extinguished as soon as discovered if fire extinguishers were maintained in proper condition and their method of use were more generally understood. Large numbers of fire extinguishers are purchased and placed in position for immediate use in case of fire, but too often, especially in busy industrial establishments, no effort is made to instruct employes in their use and, moreover,

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they are permitted to remain for months and years without examination and testing to see that they are ready for instant use. Serious fires have occurred which could undoubtedly have been prevented if some attention had been given regularly and systematically to the fire extinguishers and their use.

Cases have happened where a fire has suddenly been discovered and soda and acid extinguishers were there, but they were discarded because they wouldn't work! On the arrival of the fire-chief he found the extinguishers were in excellent condition, but nobody knew enough about the extinguishers to turn them upside down! Had a group of employes been instructed in the operation of a fire-extinguisher, the fire could have been extinguished without damage. Other instances have occurred where somebody has used the extinguisher for some reason or other and never reported the fact that the extinguisher is empty and needs recharging. Along comes a fire—with an empty extinguisher!

Systematic inspection would prevent this catastrophe. Whenever fire extinguishers are installed in a mercantile or industrial establishment, a selected group of employes from different parts of the building should be thoroughly instructed in their use in case of fire, so that in the excitement and confusion which often occurs when fire is announced, someone with a cool head will proceed immediately to use the extinguishers. Another rule which is all-important is that extinguishers should be tagged, and whenever used, a notice with the date should be written on the tag. The extinguisher should be immediately recharged after using, and a regular inspection made of all extinguishers, at least once a year.

"NOX-AER-LEEK" FOR BOILER-SETTINGS

The Barrett Company of New York has contributed a new product to the cause of fuel-conservation in "Nox-Aer-Leek," a tough, elastic and adhesive cement for preventing infiltration of air in brick boiler-settings. It is similar in appearance to fresh putty and is applied with a trowel, the surface coating about one-eighth of an inch in thickness. It adheres firmly to the brick and will not dry out and become hard or brittle, but remains permanently elastic, contracting and expanding with the walls. The great value of this product lies in the fact that it not only renders an old or new boiler-setting air-tight, but also prevents a new setting from developing crevices, as the brick and mortar cannot absorb and repel moisture, which action tends to break down the mortar.

This product of the Barrett Company is adaptable for use on brick, tile and clay-burning kilns and will effect a material reduction in the fuel costs as well as increase the general effectiveness of the boiler.

The Barrett Company has prepared a booklet describing "Nox-Aer-Leek" in detail, which will be gladly sent upon request.

SAFEGUARDING GRINDING WHEELS

The Norton Company, Worcester, Mass., as most industrial officials know, manufactures grinding wheels. This concern has not only specialized for many years in manufacturing high quality grinding wheels, but also the Norton Company has given very careful attention to the subject of preventing grinding wheel accidents. This concern has placed on the market safety hoods for protecting the worker in the event of a grinding wheel bursting at high speed. A number of excellent booklets have been issued by the company dealing with the prevention of accidents and showing how grinding operations can be performed without danger to the operator. This is an excellent example for manufacturers who produce industrial equipment which, if not properly safeguarded, offers a hazard to the operator, and the more a manufacturer pays attention to the feature of safety in producing his equipment, the greater preference will there be shown by industrial safety officials to that product. A machine does not fulfill all the requirements of the purchaser if it presents a hazard which can be removed by a safeguard. If all machines which present a hazard to the operator were adequately guarded before put in operation, a large number of accidents would be prevented.

The Norton company realizes this, and not only furnishes grinding wheels, but also the safeguards as well. Information regarding various safety appliances for grinding wheels may be had upon request.

NICHOLAS POWER COMPANY

Edward Earl, president of the Nicholas Power Company, New York, the manufacturer of the well known Camerograph moving-picture machine, which is now being extensively used at safety meetings for showing safety films, was tendered a surprise dinner recently by a number of his business associates and friends at the Hotel McAlpin, New York.

That Mr. Earl enjoys wide popularity among those who know him was made evident by the large gathering at the dinner. Mr. Earl seemed to be especially popular with many of the Nicholas Power men, which indicates that he has engendered a fine, healthy, co-operative spirit in the organization of which he is head. The policy of the company has always been to progress by earnest and worthy endeavor and to maintain an enthusiastic and co-operative spirit in all departments. The success which the Camerograph machine has achieved must be a source of great pleasure to Mr. Earl, but the popularity which he enjoys among his colleagues also indicates that he is equally successful in dealing with those with whom his different enterprises bring him in contact.

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SAFETY ENGINEERING

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Industrial Safety as a War Measure

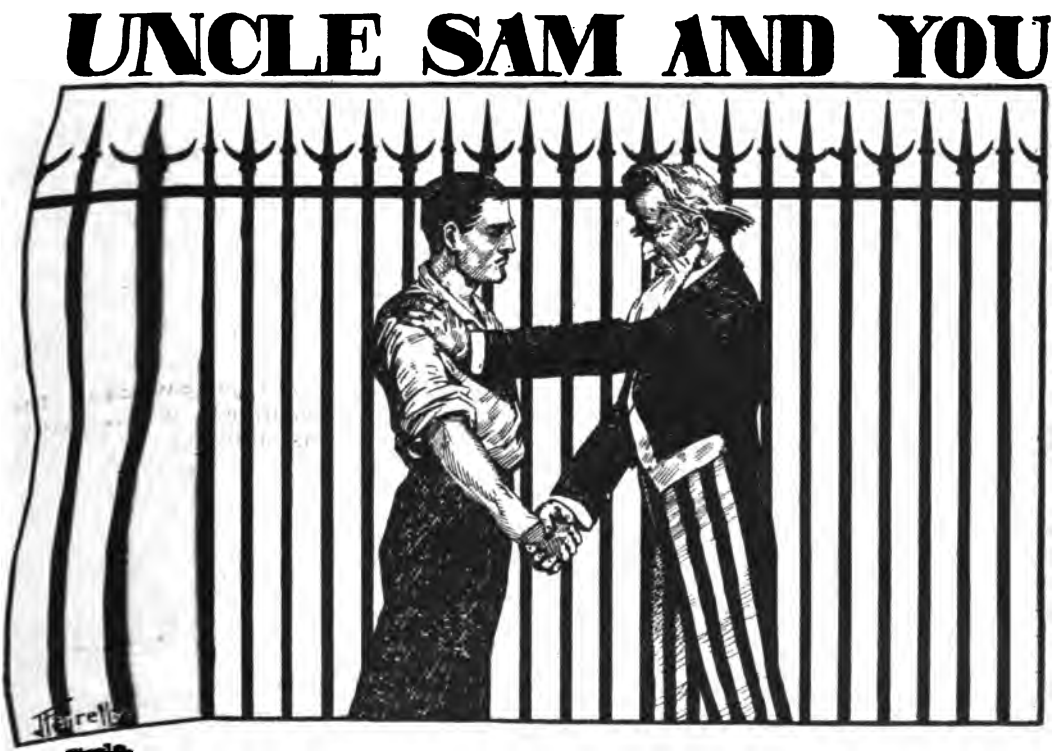
By Arthur H. Young

Director of the American Museum of Safety

An Address Before the Second Annual Safety Convention, New Haven, Conn.

I CAN well confine myself to the activities of our own Federal Government in the conservation of its industrial employes.

Two chapters in the story stand out prominently. First, the Council of National Defense, through its labor representative, Samuel Gompers, included accident prevention as a necessary part of its functions, and as early as May 2, 1917, announced its intention of appointing a welfare committee to formulate standards of safe equipment and practices for required observance



The Circle.

Industry must reinforce arms. Resources are as necessary as recruits.
Humming gun-plants mean speeding bullets. To speed production is to hasten victory.
Service is the watchword of the hour.
On the battle front and at home Uncle Sam needs millions of hearts and hands.
Have you given YOUR heart and hand? Are YOU a real soldier?

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by manufacturers seeking Government contracts.

Lew R. Palmer, then president of the National Safety Council, was later named as chairman of the sub-committee to effect standards of accident prevention, dust and fume control, fire prevention and structural safety. Each of these four topics was assigned a known expert in each particular field, with power to recommend the personnel of an advisory committee.

Marcus A. Dow, general safety agent of the New York Central Lines, was the choice of Mr. Palmer and Mr. Gompers for the development of the accident prevention campaign, and though he proceeded at once with the appointment of a committee and the preparation of standards, the committee on labor of the Council of National Defense has, up to the present time, found itself so overwhelmed with other duties as to prevent definite, constructive action.

The second chapter is the story of accomplishment by the United States Employes' Compensation Commission. Again it was the energetic Lew R. Palmer who was the moving factor in "starting the ball rolling." On May 11, 1917, he called on Riley M. Little, chairman of the newly appointed United States Employes' Compensation Commission, and offered the services of the National Safety Council for any purpose which would help the Government in its industrial mobilization.

Although Mr. Little had been in office less than a month, he quickly grasped the possibilities of Mr. Palmer's offer to place at his command the cumulative experience and ability of the 3,500 units of its muster-roll of practical safety experts, and, after a single conference, there crystallized the first "Safety Survey of Federal Industrial Establishments."

To our embarrassment as loyal citizens, we must admit that this was the first time our Federal Government, as an employer, was concerned as to the possibilities of immunity from accidental injury of the thousands of men and women employed in our navy yards, arsenals, supply depots, mints and other Federal industrial plants. But, to our everlasting gratitude, be it remembered that such men as Mr. Palmer and Mr. Little were placed in contact and had the vision to see and the courage to act in a manner which has, within a year, so committed our Uncle Sam to the proposition of "Safety First" as hold promise of his leadership in the field of employers betterment efforts.

Mr. Little secured the consent of the Secretaries of the War, Navy, Treasury and other departments to have the National Safety Council inspect their plants, make a written report of conditions as found and suggest remedies where needed. Mr. Palmer forthwith loaned our "Billy Sunday of the Safety Movement," C. W. Price, to the compensation commission as director of safety survey. The members of the National Safety Council freely offered their services, without compensation, as inspectors, and before June 1 the work was under way.

Mr. Price rapidly schemed his organization, selected his helpers, commissioned them as "safety experts" in Federal service (compensation $1 per year), and the chips began to fly. The country was divided into six sections, each in charge of a district director of safety survey (no increase of compensation, however, to those thus promoted from "safety expert").

1. David Beyer, vice president, the Liberty Mutual Insurance Company, Boston, Mass., was assigned to the New England district, including:
   (a) Watertown Arsenal
   (b) Springfield Armory
   (c) Portsmouth Navy Yard
   (d) Boston Navy Yard

2. The American Museum of Safety was assigned the Middle Atlantic Division, including:
   (a) New York Navy Yard
   (b) League Island Navy Yard
   (c) Watervliet Arsenal
   (d) Picatinny Arsenal
   (e) Frankford Arsenal
   (f) Philadelphia Mint
   (g) Schuylkill Arsenal
   (h) Marine Quartermaster's Supply Depot (Philadelphia)

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3. Harry Schultz, chief safety engineer, American Steel & Wire Company, was assigned the Southern Atlantic District, including:

(a) Washington Navy Yard
(b) Norfolk Navy Yard
(c) Charleston (S. C.) Navy Yard

4. R. J. Young, manager, department of safety and relief, Illinois Steel Insurance Company was assigned the District, including:

(a) Rock Island Arsenal
(b) Jeffersonville (Indiana) Supply Depot

5. John R. Bronnell, superintendent, safety department, California State Industrial Commission, was assigned the Mare Island Navy Yard.

6. V. A. Hancock of the Aetna Life Insurance Company was assigned the Bremerton Navy Yard, Puget Sound, Wash.

Each district director was made responsible for the complete survey of the establishments in his section and to choose volunteer safety engineers to assist. Day and night Price travelled and worked, introducing his helpers to the commanding officers of the posts, "selling" the safety idea to them, and opening before their eyes the vision of a working force free from injury, enthused and re-energized by real, organized co-operative safety effort.

The safety survey was not only an inspection of physical equipment, it included educational work with the personnel as well. Noonday meetings of workmen were held, addressed by the safety experts; bulletin boards were made, foremen's meetings organized; in fact, so far as the time would permit, the whole scale of "stunts" to boost safety work was played.

On June 30 the survey was completed, and Price soon rendered his final report, which, as an engineering document, has been appraised at $50,000 by Government experts. But the great value of the document, far outshining the detailed report and recommendation concerning every physical hazard of the plants, was that it showed the necessity of "safety *organization.*" In fact, he went so far as to say that he could not recommend the expenditure of the huge sums necessary for mechanical guarding, unless the Government saw fit to carry on the educational work in a systematic manner.

The actual demonstrations of efficiency which had been made by the survey were so convincing that the department pledged a continuance of the work, and asked Price to select a safety engineer for each arsenal and navy yard, and remain with the Compensation Commission to assume their supervision and make sure that the work in the various Government branches would be co-ordinated. However, other plans more important intervened. The position of chief safety expert was created by the United States Employes' Compensation Commission, but it was discovered that the law creating the commission did not legalize expenditure for safety work. In this dilemma the trustee of the American Museum of Safety offered the services of its director, without salary or expense to the Government, and since September I have had the high honor of carrying out the plans formulated by Price.

Not only have safety engineers been appointed at each of the navy yards—and it should be stated these appointments are permanent civil service ratings—but other Government plants, such as the explosive manufacturing plants at Nitro, W. Va., Nashville, Tenn., and Mussel Shoals, Ala., have done likewise, and today there are 19 safety engineers in the Government service.

Three general conferences have been held at bi-monthly intervals, and important standards have been developed. These are not necessarily new; they represent in part a careful revision of existing material, referring to accident prevention features to be included in the design and construction of: building construction; wash, toilet and locker rooms; power plants and prime movers; crane construction; elevators and appurtenances; eye protectors; fire appliances; lighting code; plant rules and regulations; power transmission apparatus; remote control appar-

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atus. The text, copiously illustrated, is now being revised by the United States Bureau of Standards and will soon be issued as Government documents.

Still another equally important chapter is that of the safety work of the Emergency Fleet Corporation. Our esteemed co-worker, Harry A. Schultz, has been appointed chief safety engineer. He is about to appoint 11 divisional safety supervisors, in general charge of organized safety activities in the 150-odd shipbuilding plants of the country, and their plans ultimately conceive of a safety engineer, with consequent complete organization, in every plant.

I can not close without reference to the plans of the Federal Railway Administration in reference to safety work. By executive order of the director-general, Hiram W. Belnap has been appointed superintendent of the newly created safety division. He has selected Harry J. Bell of the Northwestern Lines as regional safety expert, in charge of Western Lines. Three other appointments soon to be announced will complete his regional organization. R. S. Jarnigan, assistant general safety agent of the New York Central Lines, is special assistant to the superintendent of safety, and it is probable that new impetus will be given to accident elimination on our railroads.

These are big doings. There are others that time precludes description. The Federal Bureau of Vocational Education is about to compile text books on safety in every trade taught in vocational schools, and will require their use and the inculcation of safe practices in the curricula of the schools. Our engineering colleges are awakening to the necessity of teaching safety, and are about to start a co-operative and complete presentation of the subject as required work by engineering students.

There is a fable that comes to us from the Orient, which has to do with the phrase "And a phoenix arose from the ashes." You will recall that the fable relates that the phoenix, a giant bird not unlike our eagle, is born of brilliant plumage and royal mien. It goes forth from its native shore in full glory, but after a lapse of centuries returns, bedraggled, its plumage torn, missing and smeared from contact with the worldly world. Painfully it gathers branches to form a funeral pyre. Perching thereon, the sun kindles the pyre and the bird is enveloped in flames, only to rise, made anew, its plumage glorified, its youth restored by the fire, and, thus, they say "A phoenix arose from the ashes." May it not be that our great and glorious eagle, that wonder-bird of National emblems, had been smeared somewhat by worldly contact, dollar-chasing and individually concerned selfish pursuits? May it not be that this war may be likened unto the funeral flames, and our glorious eagle, phoenix-like, arise therefrom, arrayed in plumage symbolizing the universal brotherhood?

These are the hands of workmen maimed while engaged in peaceful industries

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Stopping Fires by Fire Doors

By C. E. Worthington

IT is by no means a far cry back to the time when conflagrations were looked upon as punishments by God for the sins of the people, or at least some of them. Indeed, some curious old prints of the great fire in London (1666) show avenging angels with flaming swords hovering over the city.

The belief in fire as a mere instrument of vengeance does not appear to have precluded some concerted attempts at checking its ravages, since bucket brigades, or what corresponds to them, existed at an early period, but neither did the fact that the great fire originated in a wooden house (like the majority of great fires) appear to have had any special lesson attached at that time.

Between A.D. 798 and A.D. 1915 there were nearly 200 fires that have gone into history as great conflagrations. One city (Constantinople) was ravaged 23 times during that period, and is probably as badly exposed to a recurrence today as it was 500 years ago.

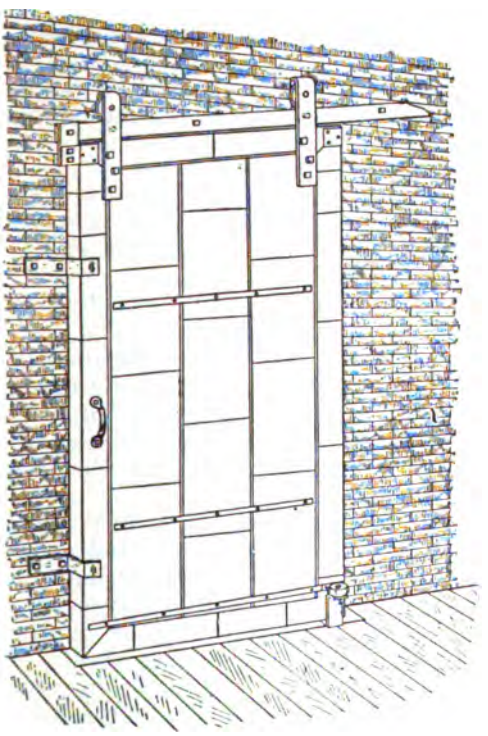

Fig. 1. Standard tin-clad sliding door closed

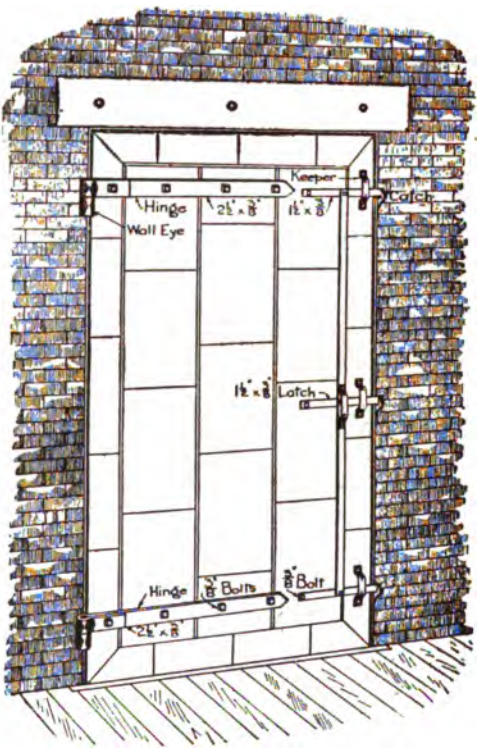

Fig. 2. Standard tin-clad swinging door closed

Religious beliefs have much to do with the public attitude, hence in freer thinking Europe notice was taken at a fairly early date and local regulations adopted looking to some relief, and with the progress of civilization and decline of fatalistic beliefs the stringency and efficiency of these regulations increased, not unaided perhaps by other external conditions, until the general fire hazard of some countries, as shown by the statistics of per capita fire loss and cost of fire brigades, is surprisingly small.

In the United States in the earlier period of its existence cheap wood and absence of diffused knowledge of what was happening at remote points contributed to what suggests public indifference, and

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not until well into the nineteenth century was there taken any concerted movement for betterment.

During that century owners of certain groups of manufacturing interests awoke to the fact that the persistent frequency with which their factories were destroyed was developing into an intolerable tax, and, being men of intelligence and action, set themselves about discovering why and how best to prevent.

At the outset there was no suggestion of any other impulse than the purely selfish one of devising means to decrease the fire tax on their own property; that of others was no concern of theirs.

But they did set about it and succeeded to such an extent that public attention was attraced to their methods and results. Statistics became increasingly available, until finally there began to be a more general realization of the stupendous annual calamity of the fire loss, not merely affecting specific groups, but the entire nation.

One of the earlier conclusions of the investigations was that, since differing manufacturing processes in a single mill differ much in the frequency with which fires develop in them, one of the first steps would be to isolate such hazardous processes from the remainder, and this subdivision naturally suggested further subdivisions as a means of limiting the extent of damage, and from this came an application of the value of incombustible dividing walls, fire walls.

What particular infidel or heretic, what Tom Paine or Ingersoll first made the discovery we do not know, but we do know that among those interested the "unavoidable calamity" theory lost ground and all but disappeared to give place to a new belief that all fires are due to some human fault or neglect and nearly all are controllable in their earlier stages.

Fire walls forming complete divisions would be inconvenient and sadly interfere with business, hence openings through them must be conceded for ready passage.

It took but little experience to demonstrate that the earlier belief, to the effect that by limiting the area of passage a fire could be met and fought at unprotected

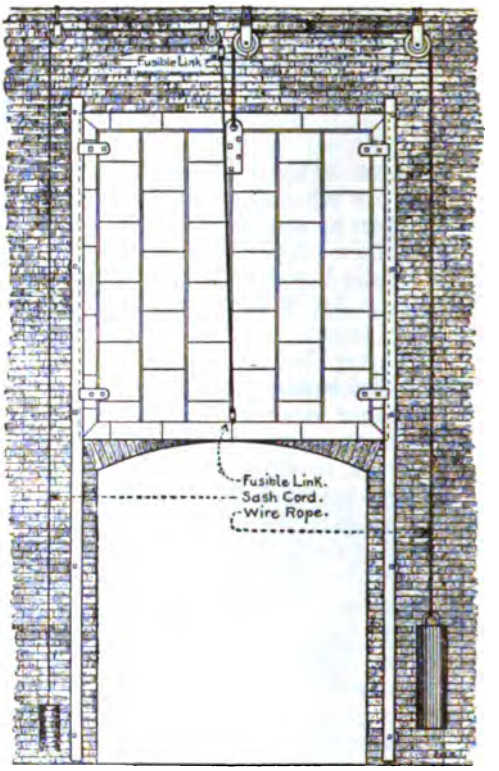

Fig. 3. Standard tin-clad vertical balance door

openings, was erroneous. That it was an error might have been thought out in advance, but experience is a better teacher, although more costly.

This is the evolution of the fire door, but the highly specialized affair of today has little in common with the earlier attempts.

Seen today as we occasionally see them, we wonder at the belief in their efficiency. Of course, sixty-odd years of study, observation and experiment ought to produce an efficient article; but, alas, despite propaganda and educational attempts, the production of curios has not wholly ceased even yet.

One conception of a fire door fairly prevalent at one period consisted of an ordinary paneled door of wood hung in the usual manner by butt hinges to a wooden frame and covered on one or both sides with overlapping sheets of iron tacked on. Picture this in your mind's eye and compare it with the doors of today. (Figs. 1, 2 and 3.)

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The modern idea of a fire door is that it shall, as nearly as a door can, be as resistant to fire as the wall, the opening in which it protects. Not that such a result is actually attainable, but it is so nearly attainable, that except under extremely unusual and unfavorable conditions, the sought-for result is usually realized.

The best known and most generally favored form of fire door is the wooden door covered with metal. The basic principle of this door is the production of charcoal, i. e., that wood, if air be practically excluded, will part with certain volatile parts, leaving a mass of carbon which will retain its form and some measure of strength. It is on this line that development has progressed furthest.

From the earlier attempts at construction to the present standard form the lists of discovered defects as each new and advanced form was tested are too long to attempt to enumerate, but as each defect was developed some measure of remedy was adopted.

Fig. 4

Fig. 5

The efficiency of the modern door of this construction is exhibited in the cuts below, of a shutter (exactly the same thing as a door except in location) in the Naumkeag Mills exposed for hours to the intense heat of the Salem conflagration. The cuts (Figs. 4 and 5) show clearly the condition of the shutter after that severe test and of the room it protected.

Another fire door of standard construction is shown in Fig. 6. This door was between two sections of a cordage mill, one of which was totally destroyed. The picture was taken from the side toward the fire after it had burned out. The condition of the door after this ordeal speaks for itself.

The inference must not be drawn that it is intended to hold up the wooden fire door as infallible. In fact, it is yet far from it, and there is no reason to believe that the process of evolution has ceased, but we may emphasize its *comparative* efficiency at this time. Nor is it the intent to promote this construction at the

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expense of other forms beyond insistence that their efficiency must be demonstrated in competition.

To further illustrate this, the picture (Fig. 7) is of a standard fire door between two sections of a paper warehouse, one of which totally burned out. This also was taken from the fire side and shows more clearly than the first cut the condition of the standard hardware, and the absence of "bulging." The gas vent slightly enlarged by the fire is visible.

Fig. 6

In partial contrast with this is Fig. 8, a door nearly but not quite up to standard construction. It will be noted that this door served its purpose well by holding up to form, although the tin on the exposed side bulged until it ripped and fell away, permitting the destruction of the wooden core. The fire conditions in this case were exceptionally severe.

If conflagrations are to be avoided the incombustible division or fire wall must play an important part, and where openings through such walls are needful they must be protected as thoroughly as possible.

Too much emphasis can hardly be placed upon this, nor upon the importance of strict observance of the published standards of construction and installation.

Right here comes the failure in the unfortunate fact that so many, who ought to know better, firmly believe that they can produce, practically by intuition, a door equivalent to that evolved from 60 years of continuous study and experiment, largely by skilled engineers. Such doors almost invariably repeat some of the old-time weaknesses; in fact, precautions against these are omitted as "unnecessary," thus substituting mere unsupported opinion for experience and actual knowledge. It is a fact that in nearly every case subsequent investigation demonstrates the failure as the result of some apparently minor defect in construction or installation.

Architects of high reputation still issue specifications, merely calling "for protection of all openings by tin-clad doors," whether from ignorance that detailed specifications for such doors exist and are obtainable or from a feeling that reference to a standard not of their own making would in some manner reflect upon their personal knowledge and professional standing, and that they will not be dictated to in matters within their profession by outsiders.

This feeling is much in line with the Irishman's declaration that "one man is as good as another and a sight better," a feeling happily not shared in the least by the most eminent members of the profession.

There is likewise the feeling of city governments that it would somehow be derogatory to admit the adequacy of specifications not made by their own officials (too often selected for political reasons), and it often comes about that

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specifications are made by one who would not recognize a standard door in daylight without a formal introduction. This again is not shared by the governments of the most important cities.

It should be emphasized that a modern standard tin-clad fire door is a complex structure calling for experience and shop facilities and labor skilled and trained in this particular branch, conditions rarely to be met except in the case of established fire door makers, hence amateur construction should be always discountenanced and the underwriters label insisted upon in all cases.

Fig. 7

There are other types of fire doors, all metal, metal and wood, and metal and cement, of varying value and efficiency as compared among themselves and in varying stages of evolution. Some of these are perhaps equivalent to, or possibly under some conditions superior to, the tin-clad wooden type; some of less efficiency, many in process of demonstration, but they are altogether too numerous in variety to consider in detail here.

A cut of one of these forms (Fig. 9) which failed under severe fire exposure appears below with a cut of another of similar material (Fig. 10), which proved a complete success.

It does not follow by any means that because this failed under the severe conditions indicated it would not have proved entirely sufficient and satisfactory under other conditions; in fact, this particular type of closure has been found very useful.

The lesson is this: investigation and close study and observation with constant experiment and experience by competent engineers and other experts in this particular line, men working with a minimum of selfish interest and large public spirit, have produced a superior type of door, not only of the tin-clad type, but other approved forms.

But no one attending to a varied business can possibly have the knowledge and experience of even one of these men, not to consider the whole body of them, and it may be fairly conceded that these and such as have been trained by them have knowledge and skill in this particular respect superior to those not so trained.

The subject of fire protection and protective devices is a profession. It is fair, therefore, not only to appeal to all architects and designers and all building departments of municipalities to subordinate pride of opinion sufficiently to

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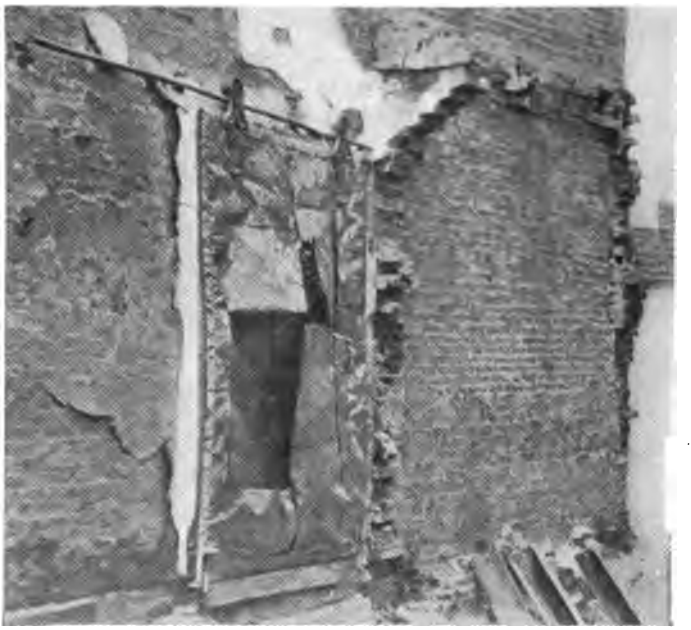

Fig. 8

Fig. 9

specify national standards in every case, but to consult freely with the experts in this line, who are always and everywhere available, as regards the type most suitable and adequate for the particular installation. It has been found impracticable to illustrate the action of severe fire upon doors of inferior construction by means of photographs after the fire, simply because that which does not exist cannot be photographed.

In laying stress upon adequate construction it is intended to lay equal stress upon adequate adjuncts in the way of hardware and trimmings, on installation and on subsequent care.

The matter of hardware is of very great importance, since a door, however well made in itself, that will fall away from the wall after a brief exposure, cannot be called effective.

It is not unusual to find doors of very good construction in themselves mounted upon the lightest of barn door tracks and hangers, frequently of sheet metal and fastened to wooden strips nailed above the opening or to little wooden plugs driven into small holes drilled in the brick by short screws with fully exposed heads.

In event of fire these screws heat quickly and very soon become loose enough to fall away, the tracks and hangers soften and buckle and the entire structure collapses. The door, entirely intact, falls away from the opening.

Of course, this is not a condition apparent in every deviation from standard hardware, but every departure from standard is in that direction until the extreme is reached through a myriad of gradations. The writer recalls one case where a set of otherwise fairly

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Fig. 10

good doors was mounted upon inclined tracks and hangers so light that when released suddenly it was almost an even chance that the spring and sagging from the mere weight of the doors would derail the doors before they would close.

In this special case the tracks were stiffened eventually by small wooden strips laid beneath them, and so remained for some years, and this, not in a little obscure out of the way shop, but in a great storehouse of a great corporation containing at all times large values in merchandise.

Adequate hardware is always obtainable, although sometimes furnished reluctantly by dealers, and lest there be difficulty in distinguishing as to what is adequate it is always practicable to procure goods bearing the label and certificate of the Underwriters Laboratories. This does not mean that there is no good and fully adequate hardware that does not bear that label, but merely that there appears to be no other universal test for a novice to apply. The unlabeled *may* be entirely adequate, the labeled article *is;* and very often calamity lies between "is" and "maybe."

Nor is there any apparatus made, labeled or unlabeled, that does not require some care and attention especially if prompt automatic action is to be expected. All iron work will corrode, and even dust accumulations are enough to prevent action by clogging at the immediate starting point where the margin of gravity above inertia is very slight. In all of these, cleaning and oiling at reasonable intervals must be practiced and the operation frequently tested by lifting the counter-weights to discern if the door, without being touched, will move and close completely. If it will not do this, attention is required. Doors where action is manual do not require such tests, but should also be kept in good condition.

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The Safeguarding of Machinery

By F. W. Carter

Master Mechanic, Gilbert & Barker Manufacturing Company, Springfield, Mass.

IT is rather beside the question to tell some one else how to make guards for his particular machinery, so I will confine myself to the methods employed by us in safeguarding the machinery in our plant.

In making belt guards we use angle iron for the frame of 1¼" or 1½" x ¼", depending upon the size of the guard, with ½" mesh No. 10 wire screen. In the guarding of gears, flat iron for the frame, with sheet iron sides in some cases, and in other cases No. 10 wire ½" mesh screening is used.

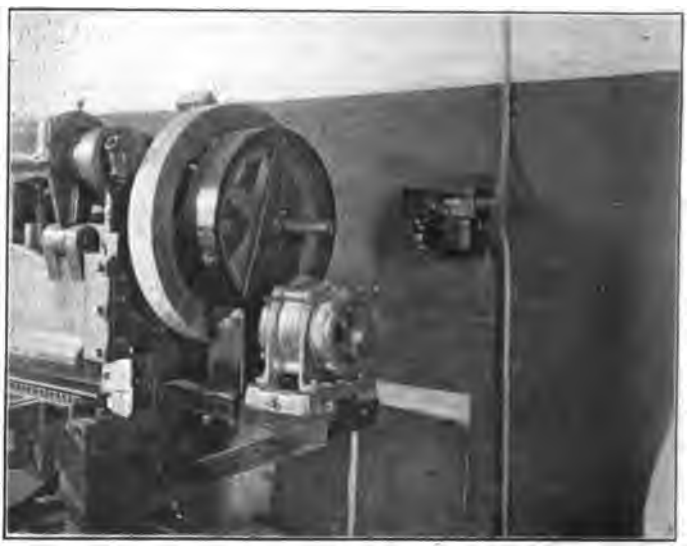
On the silent chain drives a dustproof, sheet iron case of about No. 16 gauge is used to keep the chain, gearing and sprockets entirely covered.

On the switchboards, to protect persons from coming in contact with the buss-bars, grille guards of No. 8 wire 1½" mesh, ⅞" channel iron frames are used.

On the motor drives, a plain guard made of pipe 1½" or 2", depending upon the size of the belt, is used, a guard being placed at the motor pulley and driven pulley for the purpose of taking the slap of the belt if the belt should break.

Our elevator motors are enclosed entirely

Flanger and Beader, "After" Change from Belt to Silent Chain Drive, with Dust Proof Guard. Note also Gear Guard.



Machine Originally Belt Driven from Line Shaft, Now Motor Driven. Note Gear Guard and "Safety First" Type of Motor Switch, Giving Workman Complete Protection, Electrically and Mechanically.

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with grille guards of 1½" mesh No. 8 wire channel iron frames.

All power and lighting buss-bars, fuses, and switches throughout the factory are enclosed in steel cabinets. The cabinets are locked and no one has access to them except an experienced electrician.

All switches on motors are of the safety type oil switches.

Our experience has been that step cone pulley guards are the hardest to make, as it is necessary to provide for the shifting of the belt from one step to the other.

As to the standard height size, etc., of guard, we have not adopted such a standard, although it is contemplated, and such a step should be taken.

One of the difficulties that we have in the guarding of machinery has been the question of keeping the guards in place after they are once put on. A condition that is especially obnoxious to us is the fact that our rapid growth causes a continual changing of machinery. We have found it necessary, in order to maintain the guards after being once installed, to adopt what might be called continuous inspection, regular inspection not seeming to fit the inspection requirements.

In our pattern shop and grinding room dust and ventilating systems are being in-

Glass Protector. Men Also Wear Goggles

Method of Guarding Overhead Motor Drive Belts to Prevent Belt from Striking Workman, if Belt Should Pull Apart

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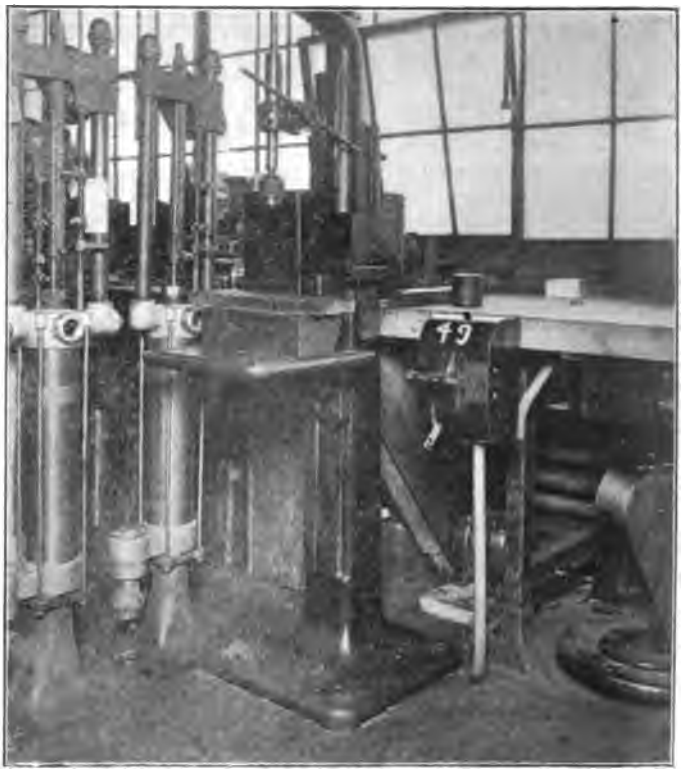
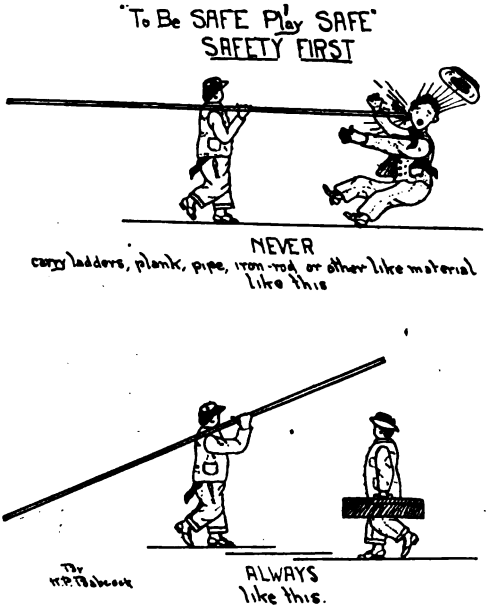
stalled. All our grinders have protection for the eye. We have adopted three different methods in succession, but are not sure that we have the best now. The first was to provide a goggle for each machine, which is unsanitary and an eye-disease breeder. The second was to provide goggles for each workman, which was an expensive proposition. The third was to provide a glass guard over each grinder wheel.

The question of guarding elevator pits, the proper type of guard, is a serious question, and on our No. 1 elevator we have installed a Peelle fire and elevator door which has been in operation about nine months and seems to be very satisfactory.



Another Instance of Complete Protection, Electrical and Mechanical



One of Gilbert & Barker's Home Bulletins

It is not only safe but it is fireproof, the special features being that the elevator cannot be started leaving the landing unprotected unless the door is closed.

Another thing that has helped materially to reduce our accidents has been the adoption of home bulletins.

Our fire-fighting organization, which has just recently been perfected, may be considered along the lines of "Safety First." It consists of one fire chief, one assistant fire chief, one battalion chief, piper, electrician, fire apparatus inspector and secretary. Two hose companies, each having one captain, lieutenant and six hose men, one hook and ladder company, captain, lieutenant and six men; one chemical company, captain, lieutenant and four men, and one salvage company, captain, lieutenant and fifteen men. Monthly meetings are held. Men are trained for their stations and the organization keeps ready for fire emergencies.

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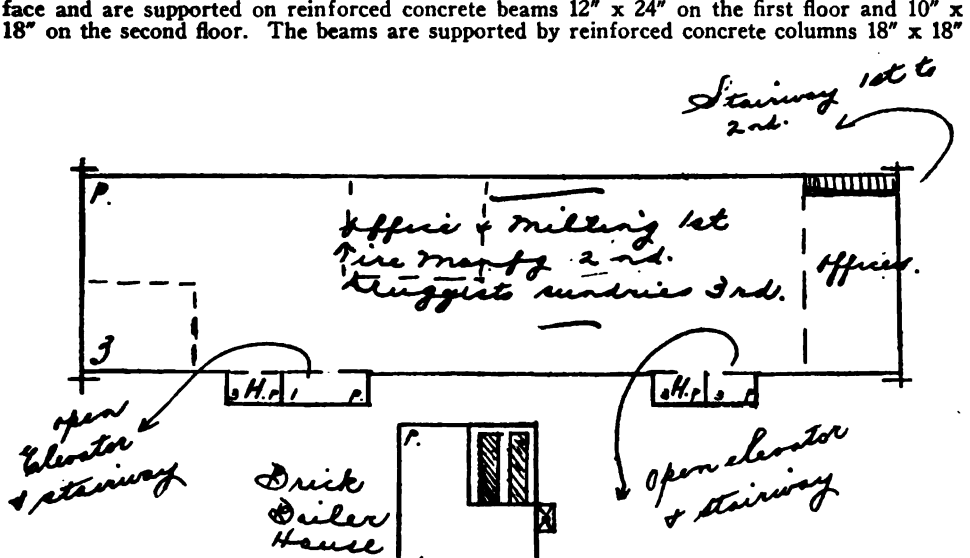
Rubber Tires and Druggists' Sundries

WE are enclosing a plot plan of one of our local industries engaged in the manufacture of rubber tires and druggists' sundries.

The building is 3-story in height and is of reinforced concrete construction. The walls are piers of reinforced concrete, 24" x 24" on the first story, 18" x 24" on the second story and 15" x 24" on the third story. These piers are placed on 18' centers and the curtain walls are of 9" brick on each story. The windows are of ordinary glass, being set in wooden sash and frame. The floors are of 5" concrete slabs covered with 7/8" maple wearing surface and are supported on reinforced concrete beams 12" x 24" on the first floor and 10" x 18" on the second floor. The beams are supported by reinforced concrete columns 18" x 18"



on the first floor and 15" x 15" on the second floor. The roof is of wood, 1" in thickness, covered with composition and is laid on wooden joists, supported by unprotected steel truss. The end walls are parapet 13". On the side walls there is a wooden cornice 14" x 8". The stairways and elevators are in brick shafts but the openings are not protected, stairs and hoist of wooden construction. The finish throughout the mill is open although there is a considerable quantity of frame partitions used for office and incidental purposes. We have been informed that as far as the concrete work goes it should be good as the contractors had a good knowledge of this form of construction. The ground floor is used for office and milling room, the second floor for the manufacture of tires and the third floor for storage and manufacture of hot water bottles, tobacco pouches and other rubber goods (no dipping processes)—rubber cement in the building limited to a day's supply. The power house and heating plant is detached. The property is under ordinary municipal fire protection within reach of 3 hydrants. The company has no standpipe or hose or other form of protection of its own. Not sprinklered.

We would like to obtain SAFETY ENGINEERING's opinion or advice as to this class of risk from the standpoint of the assured. From fires on which you have received reports maybe you can tell us the maximum amount of damage that could be done to the building, also the susceptibility to damage by fire of this class of stock. Any information you can give us along these lines or any reports that you can obtain for us of fires in similar plants will be greatly appreciated.

AMONG recent inquiries received by SAFETY ENGINEERING, regarding the construction of factory buildings, is the foregoing.

The general estimate of the fire hazard of that part of the business devoted to tire making is the same as of all soft rubber working and about in line with linseed oil mills and combined metal and woodworkers.

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Druggists' sundries, however, is an indefinite and elastic term. Factories operating under that name frequently use pyroxylin compounds (celluloid, etc.) in large quantities; others make more or less hard rubber goods and often handle large amounts of carbon disulphide, which is a little worse than naphtha. In your case, however, the business appears to be soft rubber, practically.

This is generalization. In arriving at a definite classification of any particular factory, the result must be obtained from general statistics by a method of elimination. This is fairly accurate in a general way, but the process would require too lengthy a description to be given in detail.

Your hazards may be classed as "considerable" as regards liability to originate fire, combustibility and developed heat, but there is no numbered sliding scale in existence by which its exact comparative position can be given. In fact, factories of this class do not yet approach uniformity of processes to an extent that would make that possible.

Structurally, your factory is very good in part and very bad in part. Unfortunately, the effect of the very good part is to make the very bad part worse. No criticism can be passed upon the reinforced concrete work. Superficially, at least, it is good and any criticisms would have to be based upon minor details not stated. Wooden top flooring is not particularly objectionable, but wooden cornices are to be deprecated.

It is an axiom among firemen that when the roof of a burning building collapses it very often insures the destruction of the upper stories. Roof strength and endurance are vital to fire resistance. Yet your roof is almost the weakest possible. Not only is the covering combustible and thin, but the trusses may be expected to buckle very quickly over a fire of the intensity afforded by your stock and wooden partitions. We have records of fires where this result has been reached within 8 minutes of discovery of fire. That the strength of a chain is the strength of its weakest link is in the main true—but what may be said of a chain where the weakest link replaces one that should be exceptionally strong? The roof should be at least as fire resistant as the best part of the remaining construction.

This construction greatly menaces the safety of firemen who may enter the building, and knowledge of its weakness may operate to deter them from entering.

Many fire chiefs, knowing the construction, would forbid their men to go on the third floor with even a small fire burning there.

Fire spreads through vertical channels. The absence of adequate fire doors on the elevator and stairway shafts insures rapid spread. This is the most prominent lesson of every conflagration. One cannot read the stories of fires without being struck by the constant repetition of "The fire spread almost instantly through the unprotected stairways and elevators, attacking all parts of the building nearly simultaneously."

There is little chance for salvation with these vertical channels open, and the closure can never be too good. The very best grade of automatic doors is needed, and these even will sometimes fail. Whether the stairs are wood or noncombustible does not matter so much as their strength. Many good authorities favor heavy oak stairs.

To prevent "mushrooming" by fire which may enter the shaft it should be topped with a skylight of the lightest possible construction and very thin glass protected from brands, etc., or by nets above and below. If fire gets into the shaft in one story it must be prevented, if possible, from getting out in the others.

Thin glass windows in wood sash, even in an isolated building, contribute to the hazard, as they soon break and admit large volumes of air. Wire glass in metal sash is better.

The need and value of wire glass increases as exposure to other buildings increases. If it is possible to construct other buildings within burning distance of your building, the neglect to protect all openings on the exposed side or sides, by the use of wire glass, is a vital error.

Fire in the contents of a building with refractory walls and ceilings burns with much greater speed and intensity than in one of ordinary construction. The analogy is a high temperature furnace. In

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a reinforced concrete structure, ignition once accomplished, you get a hotter and a quicker fire—very much hotter and quicker, though, of course, of less duration. Hence the very strength of your building reacts upon the defects to make them worse.

The probable result of a fire in your building would be its rapid spread to all parts, almost at once, and a speedy collapse of the roof. All finish of combustible material and all combustible contents would probably be destroyed.

The concrete work would be dehydrated and softened at the surface—½ inch or more. Such a building as yours in the concrete part should outlast about 3 complete fires. Hence the impairment of strength would not be likely to be serious in the first fire. Some repairs would be required.

If there are any weak spots in the insulation, there might be some failures of parts. You would, of course, lose the entire third story.

It is hardly probable that hose streams from the outside could control a fire in a building provided with such efficient means for spreading fire, unless applied at the very outset. Probably they would prove ineffective. The fire in the Edison (fireproof) factories is a case in point.

Elimination of wooden partitions is advisable. These should be noncombustible but not necessarily "fireproof." The difference in cost is small in comparison with wood.

The matter of the personal safety of the workers appears to have been entirely overlooked or forgotten. No means of exit from the third floor (where probably the majority of the women workers are employed) is provided except one open stairway and an open elevator—unless, perhaps, plunging through windows to a fall of 20 feet or more is to be considered a means of exit.

These vertical open shafts are simply flues or chimneys serving to collect, condense and discharge violently upward, smoke, flame and gases from a fire below. Unless the experiences of a thousand similar cases be reversed, they could not be entered with a fire of appreciable magnitude in progress on a lower floor.

This precise arrangement is what constitutes a "fire trap" and is the primary cause of about all loss of life in factory fires. We could fill an entire issue of SAFETY ENGINEERING with brief abstracts of the records of fatal fires, where exits were limited to one open stairway (sometimes two open stairways) like yours. People trapped in burning buildings are very rarely killed by actual contact with flame. Smoke, heat and noxious gases claim their victims far in advance of the actual fire. One part in 2,000 of the invisible, colorless, tasteless, odorless carbon monoxide is fatal to those who breathe it. Yet this is only one of the poisonous and fatal gases of fire. All combustion produces some carbon monoxide; at times it is a chief product. The best means for preventing the diffusion of smoke and gases is the best means for protecting life. Vertical, unprotected openings promote instead of obstruct such diffusion.

The conversion of your stairway shaft into a smokeproof fire escape seems practicable at small cost. Such conversion would afford at least one fairly certain means of escape for every employe and would not interfere with the use of the stairway for ordinary purposes.

Sprinklers are very desirable in "fireproof" structures, for the reasons quoted above, since the fireproof character of the building instead of minimizing the danger to contents actually has the contrary effect of increasing their combustibility.

In buildings of this class sprinklers are especially effective, since the rapid rise of temperature puts them in operation quickly, before a fire gets under way; also because the structure being noncombustible, their entire force is exerted upon the contents. Fire cannot spread above them in unreachable or unprotected joist channels.

We would say that an owner's interest would lie in correcting all defects (or as many as possible) and sprinklering, since the consequential damage is often the most to be feared. No insurance can compensate for the loss of trade from enforced idleness and the actual financial loss from this not infrequently exceeds the physical value of the plant.

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We regret the necessarily unfavorable nature of our comments. What fire does to a soft rubber factory is well illustrated in the destruction of the Panther Rubber Company at Stoughton, Mass. This plant, of mixed construction, sprinklered throughout and under fire department and hydrant protection, apparently much superior to yours, was completely destroyed (some 7 buildings) owing to a fire occurring in one section while the sprinkler valve was temporarily closed. The alarm was given very promptly in that case and the fire department's response was very prompt. The general defects as to unprotected vertical openings and light roofs were much the same as yours, although part of the plant was of wooden joisted construction.

We should add a word of commendation. Your detached and isolated power house is a feature of marked excellence. This arrangement seems ideal or nearly so.

Habits of Health and Cleanliness

A BULLETIN issued by the Pennsylvania Department of Labor and Industry declares that the chief aim of education is to train the individual to do the right thing at the appropriate time without having to think. From habit the varied activities of our daily life become automatic, leaving the higher powers of the mind free for the performance of their own peculiar work. In order to make our nervous system our ally and not our enemy in relation to habits of health it is necessary to make automatic as early as possible as many acts as we can which will promote our physical well being. The employe and his trade, the employer and his profit, the product and the national output, are either helped or injured by the method of living of each individual. It is generally recognized that chronic habits of unhealthy living produce industrial inefficiency, and this is strikingly illustrated by alcoholism, but such losses among employes are easily controlled because they are apparent. On the other hand, losses from faulty personal habits or bad housing conditions are more difficult to anticipate and remove. For this reason it is hard to convince a worker that habits of health and cleanliness will increase his earning capacity as surely as intemperance will decrease it. Factory, shop and tenement supervision, restriction of hours of labor, prohibition of child labor—all these welfare movements inculcate in the people of the community, where they operate, habits of health which promote efficiency.

Value of Lightning Rods

THE annual property loss in the United States due to lightning is approximately $8,000,000, chiefly in the rural districts, while the average number of persons struck by lightning is 1,500. According to figures compiled by the fire marshal of Ohio, the average number of buildings fired by lightning in the past five years, in that State, was 252, with loss of $381,060.

In Louisiana 104 fires, due to lightning, involving property loss of $26,634, were reported to the fire marshal during the past year. In only one case was the building rodded, and the installation was defective.

The fire marshal of Indiana says: "Accumulating evidence shows that the lightning rod, properly placed, is certain protection against fire. Only three of the 273 lightning losses, during the past year occurred on protected properties, and in one of those cases the lightning rod system was old and out of repair, and in another the lightning traveled to the building over telephone wires."

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Making a Record in Safety Work

By W. R. Rasmussen

Secretary of the Western Pennsylvania Division of the National Safety Council, Pittsburgh

The personal experience of Mr. Rasmussen, written in reply to a request for aid in launching a safety campaign. His letter shows how a young safety engineer secured increased efficiency, reduced the cost of production and reduced labor turnover 50 per cent.

MY DEAR BROWN:

I am pleased to hear that you have been assigned to the position of safety director of the A. B. C. plant and heartily congratulate you on your promotion. Your request for a few fundamental rules to govern your activities in starting the work is rather difficult to answer in concrete form, because, as you know, a safety man has little time to spend at a desk formulating rules—he must be on the job all the time if he is to make a record. The best I can do is to give you a sketch of my own difficulties and the means I took to overcome them. I hope they will be of service to you.

When I started my work in the X. Y. Z. plant every operating official was prejudiced against the movement—thought it would interfere with production. The only reason I was tolerated at all was because the executive officers of the company demanded that a man be placed in charge of safety work—incidentally, it may be said, the plant carried its own liability insurance.

The first three months my work was regarded as a joke, not only by the men but by the foremen and sub-foremen. Every noon I visited the lunch rooms and talked to the men and tried to impress upon them the importance of the work, but with little success. A few simple safeguards were installed, but I believe they were made and placed more to pacify me than because the foremen in charge believed in their utility; and these were installed only in the most dangerous parts of the plant. I would have been completely discouraged if I had not felt (no, I knew) that I was right and that all the fun that was poked at me was just plain ignorance of what the safety movement really meant to the very men who were making a laughing stock of it. In looking back over this period of my work I am convinced that most, if not all, of my trouble was caused by lack of diplomacy on my part. I sensed something of the kind even then and one day I determined to drop general work for a time and concentrate all my energies on one specific line. So I did the obvious thing, picked out the most hazardous department in the plant, the one having the most accidents, and set to work to make a detailed study of its hazards and the possibility of remedying them.

Luckily, the superintendent in charge was a young fellow, ambitious and progressive and willing to try out the new proposition.

He had 300 men in his charge, and most of them were foreigners—Greeks, Italians, Austrians, Bohemians, etc.—and when I argued that we could go through a month without an accident he thought I was "kidding" him. We got together finally, however; I agreed to spend all my time in his department if he would promise to give me his assistance in working out the new system. I had to promise him that I would not mention the matter to any one outside his department, because, he argued, if we were unable to make good, he would be criticized for entering such a foolish undertaking. I promised him all the credit if we succeeded, and that finally won him over. Then we got to work.

First we got all the departmental foremen together in his office and explained to them in detail just what we were going to do. We told them that we wanted their co-operation and that they must clean up the department—start "housecleaning." That was the beginning—clearing aisles and passageways, stack-

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ing material in a safe manner and putting tools in their proper places.

In a day or so the department was a different looking place; the men were taking an interest and wondering what was coming next. Well, we showed them. As soon as we got the tools in their proper racks we inspected them and culled out all the imperfect ones and had them redressed; of course, we condemned the ones that were too far gone to repair. Object lesson No. 2 for our men. Then we looked up the toilet rooms and had them cleaned and fumigated and repaired and painted. We improved the lighting conditions in the shop and fixed the floors and work benches, overhauled chains and slings and ropes; repaired wheelbarrows and trucks and put things in shape generally. Of course, this took quite a little time, but every day the men took a firmer hold on the new condition and began to offer suggestions and to do their work in a safer manner.

Then we had another meeting of the foremen and began to plan guards for our machines. You see, we had to prove to the men that we were in earnest, and the foremen were the hardest men to convince; but as soon as they found that they were getting a larger product with less effort they became the strongest advocates of the new order. Sometimes the superintendent and I were on the job 36 hours at a stretch, working with the day force, then with the night gang, and back again with the first crew, but every day the work became easier. By this time the subforemen were working every minute, and everywhere we went we could hear them cautioning men to be careful and talking safety all the time. We went through the month without an accident.

With this record carefully worked out I visited every other superintendent in the plant, arguing that if the most hazardous department in the shop, where more accidents had occurred than in all the other departments combined, could go 30 days without an accident and with an improved productive record, there was no reason why accidents should occur to the men in their charge. Most of them saw the point, and safety meetings were held all through the plant, first in the departments and then general meetings were called. We continued our original plan, first getting the foremen together, then the subforemen, and, finally, all the men were called together, using interpreters to drive the lesson home to the last men. Up to the time I refer to the best record for a long time had been 21 time-losing accidents in any one month; after inaugurating the safety campaign our worst record was 5—many months we had none. I might add that after the first month or so the general manager became a convert and became one of the best safety boosters I have ever known. He always co-operated in everything we attempted and did not hesitate to devote a large part of his time to the work. He helped put safety on the map and to keep it there—it was a pleasure to work with him.

As soon as we got things running smoothly I began casting about for something to hold the interest of the men and in this connection I used bulletin boards to great advantage. Every department had a glass-covered bulletin board in which I placed the National Safety Council bulletins; others were home-made from photographs of accidents or near-accidents which occurred in the plant. The bulletins were changed every Tuesday morning, and the new ones were arranged differently each week, so that the men would know at a glance that new material had been posted. I also placed a blackboard in each department and on this we chalked things we thought would be of interest to the men, such as the names and addresses of men who were sick at home or in the hospital, with a request that those living near enough should call and see if there was anything we could do for them. This resulted in a very helpful feeling among all the men. We had other means of publicity.

At the front gate we posted the number of accidents that had occurred in the departments during the month; also the time lost by days in the plant by months, comparing these with the same month of the previous year. This gave the men something to shoot at, and, of course, they were always anxious to beat their

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former records. Over the main entrance to the plant, in such manner that the men could not help seeing it, we placed a sign which read: "WE HAVE GONE . . . DAYS WITHOUT AN ACCIDENT, DO NOT SPOIL THE RECORD BY BEING CARELESS" —the number of days being changed every morning. On top of the main entrance to the plant we erected an illuminated sign telling the story of a particularly good safety record. The men were always anxious to get a good record on this sign and they were proud to have outsiders know what they were accomplishing in safety work. This had an additional value—it helped us materially in securing new men.

At the end of the year I had a large honor roll sign painted and placed it near the front gate. All the departments were shown on this sign, which was headed as follows: "The following departments have not had an accident this year." When an accident occurred a black line was drawn through the name of that particular department to indicate that it was no longer on the honor roll. The men soon came to regard this as a disgrace and worked hard to avoid it.

I also had a large bull's-eye painted near the front entrance. It was 8 feet in diameter with 12 green and white circles and a movable red spot in the center. If an accident occurred during the month, this spot would be moved to circle No. 1; if we had two accidents it would be moved to circle No. 2, and so on. In connection with this we adopted a slogan, "Hit the Bull's-eye."

Another plan we tried was called the "accident whistle." When a man was injured someone from his department was delegated to telephone the boiler-room to blow the "accident whistle." This would call together a committee to investigate the cause of the accident and formulate a report to be submitted to the safety committee. The whistle would also inform every man in the plant that there had been an accident and the men would all want to know who had been hurt, if the injury was serious and how it had happened.

Then we would call a jury of 8 men and hold a trial. I would go out into the plant, promiscuously pick 8 men and tell them to report at my office at a certain time, but without letting them know what they were wanted for. Then we called in all the witnesses and had them tell the jury how the accident happened and all they knew about it. A statement was secured from the injured man and this would also be read to the jury. We always had a notary public visit the injured man to acknowledge his statement —this was done to make it more impressive. After the jury heard all the evidence they would decide who was to blame for the accident and how a recurrence could be avoided. The findings of the jury were always posted on the blackboards in the plant. If the company was at fault we had no hesitancy in telling the men about it.

We had a number of safety committees, 8 in all. These were known as follows: The Superintendents' Safety Committee, composed of the manager, general superintendent, and all department superintendents; Foremen's Safety Committee, which embraced the general foremen and subforemen; and six Departmental Workmen's Safety Committees. Each committee had stated meetings, once every two weeks, and at these meetings reports would be made of dangerous places in the various departments and dangerous practices among the men. Of course, accidents that had occurred were freely discussed. The Superintendents' Safety Committee passed on all suggestions made by the other committees.

I also edited a little monthly shop paper, in which we printed news items regarding the plant, but most of the space was devoted to educating the men in safety. The booklet was very popular and many of the copies found their way in the homes of the men. Very often the entire family read it and I found it did a great deal of good in keeping our safety work a live topic of interest.

We also tried to provide healthful amusement for our employes. Every month we had a dance and card party for the men and their families. This was held in one of the best halls in the city and light refreshments were usually served. We made a charge of 35 cents a couple, with a free checking room and

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no charge for children. The receipts were practically sufficient to meet the expenses of these gatherings, and as the entertainments brought the employes and their families closer together and gave them a chance to get acquainted they worked out to good advantage all round.

In addition to my safety work I also had charge of the employment department and, in fact, everything pertaining to labor. As soon as the safety campaign was well under way I took up the study of labor turnover. I found this to be extremely high and at once determined to find the cause. My first act was to give orders to the paymaster that no man was to be paid off without my signature on his time slip. This brought the men to me and I interviewed them to find out why they were leaving. To my surprise I found that about 90 per cent of the men left our service because they had had differences with their foremen. Some men complained they had to bring the foremen a bottle of whiskey every so often or they would be put on harder work or given jobs that did not pay so well; other foremen would expect certain sums of money from their men each week; still others would curse their men, "rawhide" them, and consider a working man something to be despised. I never before realized how stupid some foremen were—they never stopped to realize the importance of workmen to their employer or even to their own success. It didn't take long to stop the petty grafting among the foremen and straw bosses. After this was accomplished we had little trouble and turnover was cut 50 per cent.

The method is often more interesting than the summing up of results, so a few words devoted to our procedure in educating our foremen seem apropos. At my suggestion the manager called a meeting of superintendents (in some plants they are called general foremen), and we broached the subject of drafting a working code for foremen and subforemen. This was rather a delicate subject at first, but after a meeting or two the plan took shape and before we got through every superintendent in the shop agreed to the general outline of the scheme. Summarized, the rules were as follows:

1. Be cheerful, a smile always wins willing service.
2. Teach your men to respect rather than to fear you.
3. Never curse or bully those under you.
4. Try to assign men to work for which they are best fitted.
5. Group workmen in a manner to avoid friction.
6. Establish and maintain orderly conditions.
7. Teach workmen safe working practices.
8. Give new man personal attention and instruction and assign him to an experienced workman as a "buddy."
9. Keep tools in racks and guards on machines.

For a time some of the men tried to provoke their foremen into their old habit of swearing and kicking—perhaps they were lonesome and missed the daily matinee of seeing the "old man go up in the air," but this soon wore off when the foreman came back with a cheerful "Too bad, old fellow, that it happened that way; try it again." When one of the old hands had made a try for the foreman's "goat" and got this kind of an answer, he was generally ashamed of himself and became a booster for the new condition. The work of training our foremen to the new system took a lot of drilling and a lot of patience, but one after another the workmen got into the habit of boosting their foreman as the "best man to work for in the shop" and then the rest was easy. Before I left the plant these same foremen told me they would not go back to the old system under any circumstances; that they often went home with a grouch and were tired and nervous all the time. Six weeks from the day we started this plan at the meeting of superintendents a gathering of the same body voted it an entire success.

Sometimes we encountered conditions which we found rather difficult to overcome, because they came under the classification of "nobody's job." This very often applied to lack of cleanliness in out of the way places, and to overcome this I had a movable sign painted, reading "This is the dirtiest place in the plant,"

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and when I found a bad spot I sent for this sign and placed it where every one in the vicinity could see it. Usually the place was cleaned up at once, but if it wasn't I took a photograph of it and placed it on the bulletin boards—this always brought quick action.

Did our safety work pay? Yes, it did; we carried our own insurance and the claims for compensation were very small. After the first few months we had, I believe, one of the best accident records in our branch of industry.

Did it interfere with operations? No, it did not; it increased efficiency and decreased cost of production.

I am convinced that equally good safety work can be done and an equally good record can be established in every plant in this country.

Trough Water-Closets

[Following public hearings by the New York State Industrial Commission in Buffalo, Rochester, Syracuse, Utica and New York City, the rule published below was prepared and has been adopted formally by the Industrial Council and the Industrial Commission of the City of New York.]

RULE 10. — SPECIFICATIONS FOR TROUGH WATER-CLOSETS. — This rule shall not supersede any rule or ordinance of any municipality which calls for an equal or superior type of water-closet.

(a) Every trough or individual bowl range hereafter installed shall be of the syphon type, and shall be flushed automatically from a tank or through flush valve at intervals not exceeding three (3) minutes, while factory is in operation.

(b) At each flushing the flow of water shall be at least five (5) gallons per seat, and shall have a speed of not less than three hundred (300) feet per minute.

(c) Perforated wash-down pipes at front and rear shall be installed on every range, and shall be supplied with water whenever the tank discharges to flush the sides of the range.

(d) Discharge pipes shall be large enough to carry off excrement and paper without any noticeable clogging or backing up into the range; water-sealed traps shall be installed, which for five (5) seat ranges or less must be not less than four (4) inches in diameter, and for a greater number of seats not less than five (5) inches in diameter.

(e) Every range shall be made of enameled iron, porcelain, or other approved materials, and there shall be maintained at all times a depth of water of not less than four (4) inches.

(f) Seats made of wood or other non-heat absorbing materials shall be provided, and shall be kept well varnished. When in their normal position the seats shall be level or slightly higher in front, and so arranged that they may be easily raised or removed. They shall be separated by partitions made of wood, metal, concrete or other approved materials, spaced not closer than twenty-six (26) inches and kept well painted or varnished.

(g) Whenever, because of the nature of the industry carried on or otherwise, a continuously running stream of water is available, the provisions of sections (a), (b), (c), (d) and (e), shall not apply, except as to depth of water, which shall be not less than six (6) inches, and have sufficient speed to remove excrement and paper within three (3) minutes.

Provided, however, that no such stream shall again be used for manufacturing purposes.

VENTILATION.—Toilet-rooms and water-closet compartments shall be ventilated in accordance with the provisions of Industrial Code Rules 131, 132, 133, 136, 137, 138.

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Pulling Up Thistles and Planting Roses, or Using Tact in Accident Prevention

By Victor T. Noonan

Dircctor of Safety, The Industrial Commission of Ohio

MANY years of active accident prevention effort has absolutely convinced me that the personal, heartfelt interest of the employer is necessary, if he wishes to conserve the lives and limbs of his employes. In other words, personal tact is necessary, if one wishes to succeed in securing the best co-operation from employes in accident prevention or anything else. Many a big business has been built up on a solid foundation on this principle. On the other hand, many a business has gone on the rocks because this principle was neglected.

In observing the best accident prevention results in the industries of Ohio, I have always noticed that personal tact in handling employes, *the personal interest of the management,* was responsible for winning the highest degree of success. After all, accident prevention is an affair of the heart. The employer who pays as much attention, if not more, to the human machine—the man—as he does to the machinery in his plant is more apt to get the right results.

Andrew Carnegie once said: "You can take away all my money and all my property, but leave me my organization, my employes; and with the help of these men and these women I will replace all you have taken from me." Andrew Carnegie knew, as well as any man, that no business can be brought to the highest success without the co-operation of every man and every woman in the organization.

How, therefore, can any employer expect to reduce accidents in his plant unless he gives the same personal interest to that problem that he does to production, advertising and profits?

I KNOW a big department store that went to the edge of bankruptcy because the superintendent of that store used no tact in dealing with the employes working under him. He did not understand them. He did not want to know them. He discharged them without sympathy. The result was that the thousand men and women in that store were not co-operating to make it a success. A new superintendent, a man of common sense, tact and sympathy, within a few months brought about a wonderful change.

THE following instance will illustrate what I mean by personal interest in accident prevention, the personal, tactful plan: In one of our large mills, in Ohio, one of the workmen reported one day for his pay check under the influence of liquor. He was sent to the superintendent's office. The superintendent told the man to report the next day, when he was sober. The workman returned next day, not in the best of temper. After getting his pay check, he abused the superintendent. The superintendent said to him: "Now, Jerry, I am not going to discharge you, but I am going to send you home for two weeks. If during that time you wish to come back and talk it over with me, I will be glad to see you." Jerry went out, very indignant, threatening never to return. In the course of a few days he came back. When he appeared in the superintendent's office, that official said to him: "Jerry, I want you to take my chair, here; for the time being you are superintendent of this plant, and I will take your place. You know what our company's regulations are regarding employes drinking, and you know

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that I have disobeyed its regulation, and, in addition, that I have abused the superintendent. What should you do with me?" Jerry replied: "Well, sir, I would have to discharge you, and I would hate to do that." "That is exactly the point," said the superintendent, "I want to bring home to you. I would hate to discharge you, or any man, and yet you, and some of your fellows, do not see the point. Don't you know that I am not asking you to live up to any rule that I don't live up to myself?" The logic of this splendid superintendent's argument shot home, and since that time there has been no trouble with Jerry.

THE same superintendent found a man neglecting to wear his goggles while chipping. Going up to this workman, he said: "Joe, have you a good watch?" Joe promptly took out a gold watch and showed it to the superintendent. "How much did you pay for this?" Joe replied: "Well, this watch cost $50." The superintendent said: "How much will you take for it?" Joe replied, "I would not sell this watch because it was a gift from some of my friends; I wouldn't part with it for anything." "Now, Joe," said the superintendent, "Would you take this watch and open the case and leave it on the bench exposed to flying particles, while you are chipping?" Joe was indignant at the suggestion. He said he would not think of being so careless as to endanger his watch in that way. "Well, Joe," said the superintendent, "You take care of your valuable watch, yet, on this very job, you expose your eyes, which are far more valuable, by failing to wear your goggles. Which do you want to save more, your watch or your eyes?" Joe answered that question by faithfully wearing his goggles thereafter.

THE following story proves how one employer reached the hearts of his workmen, gained their co-operation, and brought about a remarkable reduction of accidents in his plant: A year or two ago I happened to visit a steel plant employing about 1,000 men. I asked the manager what results he was getting in his accident prevention work, whether accidents were increasing or decreasing. He turned to his desk, brought out some accident records, and showed me that his company had made a reduction in serious accidents of 20 per cent and in minor accidents a reduction of 25 per cent, a total of 45 per cent for the year. I considered that an extraordinary reduction in the plant's accidents and I knew there must be some reason. I had never heard of the company doing accident prevention work. The splendid reduction in accidents aroused my curiosity. During my visit to the plant I questioned the manager to find the reason for the prevention of so many accidents and before I left the plant *I found the real reason.* On the particular day that I was there we had our Ohio Safety Car in the yards of the plant and all the workmen had gone through it. Before I left the plant, the manager said to me: "Mr. Noonan, when the foremen were going through the car, did you notice a tall, gray-haired man?" I said, "Yes." Then he told me the story of the man: "That man is one of our best foremen, but he used to drink considerably. One day I met him and I said: 'George, I bet you a new $5 hat you cannot keep sober for three months.' George took up my bet, kept sober for three months, and won the new hat. That very day he went out and got drunk. Several days later I met him in the plant and I said: 'George, that was a nice way you celebrated your new hat.' He said: 'Yes, sir, I am ashamed of myself.' And I said to him: 'George, can't you keep sober for a year?' And George kept sober for a year. Then he took to the booze again, and so he continued for a number of years. One morning George came into my office and said: 'I would like to get off today.' 'Why?' I asked. 'The landlord is going to sell my house and I must move out.' I said, 'Do you like the house where you live?' George said, 'Yes.' 'Why don't you buy it?' George

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said, 'I have no money.' I replied, 'You have spent it all on liquor.' George said, 'Yes, sir, I realize what I have done and I know I ought to have the money now to buy a home for myself.'" Here is the climax to the story: Before George left his employer's office, the boss had arranged with a bank for a loan to buy the foreman's home, and when George went home that evening his wife was a surprised and happy woman when he told her she would not have to move out—that the little house was her own. This happy incident occurred a few years ago. The employer told me on the day I visited his plant that his foreman, George, had paid every cent on the house and since that time had never touched a drop of liquor.

This little story proves what I have always believed, that real accident prevention work must arise in the heart of the employer if the workmen are to be won to the cause of safety. That this splendid employer was interested, heart and soul, in the welfare of his employes was evident by another remark he made to me—that every time he looked at his own little children at home, he thought of the men who worked for him; he did not want one of his men to meet with an accident to cause suffering to the little ones at home.

This story every employer should take to heart. If more employers tried this plan there would be fewer accidents and a closer co-operation between the man at the top and the man at the bottom.

YOU cannot prevent accidents and make workmen safe without using personal tact. Superintendents and foremen who do not know how to use personal tact in dealing with their men are business failures. Mechanical safety guards are good. Safety committees are good. Safety meetings are good. Safety motion pictures are good. But I say that the friendly personal relation between employer and workman is the best of all. Lincoln beautifully defined this personal relation when he said: "When they lay me away, let it be said of me that, as I traveled along life's road, I always endeavored to pull up a thistle and plant a rose in its stead." Adopt Lincoln's advice. Put the human touch in your business relations with your employes. Pull up the thistles. Try planting roses. Then watch the results.

Advancing Personal Hygiene

THE Life Extension Institute, Inc., of New York City, exercises a far reaching influence in raising the standard of personal hygiene among industral employes. The work of the institute includes a purely educational service of monthly health bulletins, addresses and articles on hygiene and disease prevention, and periodical physical examinations with reports of findings as well as guidance in personal hygiene based thereon. Where medical, surgical or dental treatment is needed the individual is advised to seek treatment through regular channels as the institute does not engage in the practice of medicine. The services are supplied to individuals, life insurance organizations subscribing for policyholders, and employers subscribing for employes, with a view to improving their health and well-being. Experience has shown that more than 50 per cent of those examined required medical attention, and practically all showed need of hygienic reform. In its service to employes a trained examiner is sent to the plant to conduct the work of making periodic inspections of the individuals. By this method lowered efficiency and its probable causes can be detected and proper remedies suggested. Physical handicaps in the individual constitute handicaps on the total efficiency of an organization.

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"Nipping" the Fire "in the Bud"

By C. Albert Gasser

Inspector, Bureau of Combustibles and Fire Risks, Newark, N. J.

SEVENTEEN colored men were at work the other night in a chemical plant where picric acid was being made. In this particular building were two centrifugal machines, which, by their whirling motion, extracted most of the water from the yellow stuff and made it ready for shipment.

Each machine had an electric motor attached. The machines were controlled by a brake band, which was an S shaped belt arrangement in a wooden box about 4 feet above each machine.

The bearings ran hot, and the smell of something burning attracted the attention of the workmen to the shafting. While they watched, the wooden lining of the box caught fire and the fire increased momentarily. Burning embers dropped into the machine underneath, in which was about 100 pounds of picric acid.

The colored men ran out in dread and notified the night superintendent, who promptly sent out an alarm to the city department. When the superintendent had nearly reached the building in which the fire started there was a tremendous explosion and within an hour there had been caused damage of more than $250,000.

Prompt use of a chemical fire extinguisher would have prevented this heavy loss.

Extinguishers were there, plenty of them. What was missing? The ability to use the extinguishers. The story carries its own moral.

A citizen brought an empty 2½-gallon extinguisher into a firehouse and asked the captain to recharge it. During the operation the following dialogue was overheard by the men on duty:

Fire Captain—"Was this used on a fire?"

Citizen—"Sure, ten minutes ago."

Fire Captain—"What happened?"

Citizen—"Oh, you needn't make any record. Friction in a cutting machine or a hot box or whatever you call it. Sparks got on some celluloid scraps and shavings on the floor. One of the workmen grabbed the extinguisher and squirted it on the fire. There wasn't any damage. How much do I owe you?"

Fire Captain—"Nothing. We don't charge for filling an extinguisher which has been emptied on an actual fire. But I'll have to make a record."

And he did. Had that fire gotten away from the workman there's no telling what the loss might have been, because when a good lot of celluloid gets started there's a mighty lively blaze and much danger. This story also carries its own moral.

It does seem a pity that many men are so busy making money that they have no time to think about the possibility of fire until fire actually overtakes them. And then it is too late. How long does it take a manufacturer to get busy after he learns that one of his employes is stealing material? Not one holy minute. He's on the job on the instant and stops the leak, thereafter, in the privacy of his office, patting himself quietly on the back because of his shrewdness. And yet this same shrewd man lays himself open to attack by an enemy that surrounds him constantly and which may at any time undo in an hour what he has been building up in a lifetime.

The matter of extinguishers can be viewed from so many angles that it may seem confusing, but the problem solves itself to the most stupid man after the first few moments of mental application. Granted that fire extinguishers are excellent fire protective devices, it follows naturally that a knowledge of how to use them is necessary. An insurance man suggested that the purchase of six chemical fire extinguishers in a certain building

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would reduce the owner's premium on insurance $18.60. The man bought the six extinguishers, the agent saw them and reduced the premium $18.60 per annum. Six months later a friend of the owner saw these extinguishers in a store room and said, "What have you got these for?" "Oh," was the answer, "I get an annual reduction of about $18 on my insurance rate because I bought them." "Surely not because you bought them and left them around like this? Why, they are not even filled." "No, I haven't had time. I suppose it would be a good thing to charge them and put them up somewhere."

What does the dictionary say about it? Let's see.

"Fire extinguisher, an apparatus for putting out a fire in its early stages." That lets in about everything on the calendar, and, judging from the commodity in the market, it takes in about everything. Fire pails for water and fire pails for sand are extinguishers, and mighty good ones, too. They are often worth their weight in gold. They are the cheapest extinguishers to be had, and yet many establishments are found where there is not even a fire pail handy for use in emergency. Speaking of fire pails, an automobile garage man, applying for a license and for instructions, was told to get a dozen fire pails and to fill them, half with sand and half with water. The directions may have been a bit ambiguous, but the inspector who visited the place a day or so later to see if the instructions had been carried out was surprised to find all twelve fire pails filled with water. Knowing the great value of sand in a garage fire, he asked why six of the pails had not been filled with sand as directed. He was told that the instructions had been literally obeyed. Each pail was filled, "half with sand and half with water." The sand was in the bottom of each pail. Can you beat it?

These fire pails are not expensive. Between $3 and $4 a dozen was the price recently. If there is a manufacturer who reads this story and who has no fire fighting apparatus in his plant, he ought to get busy right away and install fire pails, at least, as the first step in his lessons on saving money by buying fire extinguishers.

A long time ago the prevailing style in fire extinguishers was a light blue bit of glassware in the shape of a fat bottle. This was filled with a chemical solution and was thrown at and into a fire. When it shattered it spilled its contents around and put out the fire. This sort of extinguisher became unpopular, it is understood, because a certain type of people put kerosene or gasoline in the glass bottle, instead of the chemical solution in order that when they did have a fire they would have a good one. The only fact which can be proven in connection with this story is that the glass extinguishers are no longer stylish.

Then came the powder extinguisher, a long tin tube that hung on a hook. In case of fire, pull, the cork comes out, throw powder on the fire. Very good. But if you did not cover every bit of the fire with powder you were wasting your time. And this sort of extinguisher was never very popular. It was not effective enough.

There followed, then, in rapid succession, one extinguisher after another, all based on the one principle of making carbonic acid gas. These extinguishers took the form of cylindrical metal tanks of about 3 gallons capacity, some smaller, many larger, even up to tanks of 60 and 100 gallon capacity which are trundled around on wheels. These are the present day standards of extinguishers, and there are many makes and types approved by the National Board of Fire Underwriters, as well as some that are not so approved.

A small hand extinguisher, usually one quart capacity, has been developed in the last few years, and is now being used somewhat extensively especially on automobiles, motor-trucks, motor-boats. The chemical used in this extinguisher is carbon tetra-chloride. This extinguisher is usually operated as a pump, and the chemical acts as a blanket over the flame, thus shutting off the oxygen in the air. In other words, it smothers the flame.

And lately we have entered new

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fields for extinguishing agents and have found that a soapy foam will smother a fire on a surface of oil. Just so will sawdust mixed with bi-carbonate of soda. And, further, a byproduct of licorice is now being used, which, when mixed with water, forms a foam that not only smothers a fire but sticks around awhile until every bit of fire is dead. This new extinguisher has been used in some wonderful tests.

All this time sprinkler equipment was being perfected and then some bright man conceived the idea of combining these two forms of extinguishers, so that the market today offers sprinkler units of carbonic acid gas extinguishers.

And yet, in the face of this wonderful progress along lines of fire extinguishment, we find throughout this broad land of ours, in time of war, when every effort should be made to prevent fire and thus conserve food, ammunition, wearing material and money, men at the head of business enterprises who do not give proper weight to the hazards of fire and the great need of safeguarding their establishments to the full limit of present-day knowledge.

Municipal, State and insurance officials charged with the duty of making inspections report with wearisome monotony, "Found fire pails empty," or "Found extinguishers had not been charged in several years," or "Found extinguishers empty," or "Found no fire equipment." These conditions are not the fault of the inspecting agents, they are the fault of the manufacturer or the manager. If this article reaches one man, only one man, who is thereby awakened to the need of looking after his fire protection equipment, then SAFETY ENGINEERING may congratulate itself on having done good work. Because, if that one man sets his house in order, it is a safe bet to make that he will live to bless the day when he made it his business to see that he had plenty of fire extinguishers on hand, and that they were in good order, and, further, that there was somebody on his payroll who had sense enough to use them at the right time. For, having secured fire pails or fire extinguishers, or both, it is not enough to hang them up and let it go at that. Employes should be instructed in the use of these upside-down extinguishers. There is not anything very difficult about it, but it is just complicated enough to confuse the average workman if he tries to learn at a time when he is excited and trying to put out a fire. He is likely to do the wrong thing. To those who know all about extinguishers this may sound like stretching the truth, but the writer knows of an instance where, after a fire had been extinguished by the regular firemen, the statement was made that none of the extinguishers were any good. Examination showed that three extinguishers had been tried by two of the employes. They had failed to even turn them upside down. Of course they wouldn't work.

In a splendid fire brigade in a big insurance company a dozen men, under drill, carry their extinguishers to the open ground nearby and try their hand in using extinguishers by putting out a purposely made fire in an ash can. And even that takes practice. The recharging of the extinguishers is done at a cost of 23 cents each. Surely it is worth all of that. How many manufacturers do as much? Mighty few, if reports tell the truth.

In one factory, which happens to be right up to the minute on its fire protection and fire prevention devices and regulations, the factory fire chief has pasted on each extinguisher the names of two workmen. This extinguisher belongs to them. They are responsible for it. They use it in fire drills; not only carry it around, but actually use it, and after discharging it they refill it. If one of the men is away the other one carries out the work alone. The fire chief said that by putting two men in charge of an extinguisher he gave these men something to talk about and made them interested in the job. He does the same thing with fire pails. By the way, he was in the habit of stretching out his arm and dipping his fingers in the fire pails 6 feet high to feel if the water was there. One of the men

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in his fire brigade saw him do this, and one day presented to the chief a little float of copper, painted red and flying a little flag. Asked what this was, the workman replied, "I thought if you put these in the fire pails they would float and you could see at a glance whether the pails were full or not." "Great," said the fire chief, and he had them make up enough for all the fire pails. This man had solved, unknowingly, the great principle of fire prevention in securing the interest of his employes.

The Bible says, "They have eyes and see not, ears and hear not." And it is as true today as it was when it was first written. Hundreds and thousands of manufacturers, going around their establishments day after day, having good eyes, fail to see the fire hazards, the dangers of oily waste lying around, floor sweepings in wooden barrels and boxes, match sticks on the floor indicating smoking, dust, rubbish and waste everywhere. The manufacturer does not see anything of all this. He can only see the machinery turning round, the men at work, the output.

In order that this article may be of real value to the reader there is here incorporated a brief statement of what to do with an extinguisher.

Every extinguisher should be tested and tried out, actually discharged, every six months. Keep a shipping tag on the apparatus and mark down the date when refilled. Keep these dates in your "future" book, and when the time rolls around it will prove a valuable reminder. You are apt to forget, and 6 months slip by very quickly. Do not discharge all your extinguishers at one time and strip your plant. Take one at a time, or two at a time, but not all of them.

Having emptied the extinguisher, flush it well with water. Let water run through the hose and see that this is unobstructed. It is not a bad idea to run a straw into the tip of the nozzle at odd times as the extinguisher hangs on its hook. Dust often clogs this tip. But to get back to the work in hand: In a pail, not in the extinguisher, mix 2½ gallons of water and 1½ pounds of bicarbonate of soda. After this has been thoroughly mixed, put it in the extinguisher. Now see that the acid bottle is clean and put in it 4 fluid ounces of sulphuric acid. Put the acid bottle in place and screw on cap of extinguisher. That's all there is to it, and yet not one man in ten knows how to do these things.

A battery of these 2½ chemical extinguishers in the hands of efficient employes will hold any fire in check There is one very important fact, however, in connection with any dissertation on chemical extinguishers, and that is, do not rely entirely and absolutely on any kind of extinguishers. If there is a fire, start right in to put it out; but, by all means, send for the public fire department at the same time. If the extinguishers work, and the fire is out when the firemen arrive, everyone will be happy. But if the fire should get beyond the chemical extinguisher stage before the public department is notified there is unnecessary delay and great likelihood that the fire will reach serious proportions. It is far better to have the public department respond 100 times, and find upon their arrival that the fire has already been extinguished, than it is for them to have only one call but that one call for a fire that is too big for them to handle with ease. The records are full of cases where employes, having great confidence in themselves, have neglected to send for help in time. This is not bravery, it is foolishness and worse. The alarm should be sounded the instant fire is discovered.

As a matter of fact, more than 75 per cent, and often in some cities it is as high as 85 per cent, of the fires are extinguished by the public fire department with chemicals. This is mostly due to the fact that the department has been promptly notified of the fact that there is a fire. In the other cases where water has to be used, sometimes in great quantities, before fire is under control, it is almost always due to the fact that the fire has not been promptly discovered, or, which is just another way of saying the same thing, that the fire department has not been promptly notified.

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National Safety in Americanization

SOME industries are taking the stand that they will promote only men who are citizens or who have applied for their first citizenship papers. In this attitude employers are moved by two considerations, patriotism and the need for national preparedness with a realization of their own responsibility; and, second, the need for an improved and more stable labor supply and a reduction in accidents among non-English speaking men. The Packard Motor Car Company, in making its announcement of this policy, said:

"We have in our organization almost 100 different peoples. We have Germans, Italians, Austrians, French, Polish, whose sympathies are divided as regards the present war raging in Europe. We have a babel of tongues and an endless variety of races and nationalities. Our workmen are divided into cliques thereby. Their sympathies are with the lands that gave them birth. They forget our national ideals. To my mind this is a source of danger not only to the company but to the whole country. The conditions of the average American factory are the conditions of this country. We have no unified people, as in France, Germany, or in other countries. In the American factory this sympathy and patriotism of each set of foreign born workmen for their native land cause friction among the men. We find that in many instances men of one nationality object to working under a foreman or higher official of another nationality. We have had letters from the men along that line objecting to employment under a boss who is undesirable because of a different nationality. So we are going to make the "bosses" in this factory Americans. Be they of whatever nationality when they come in as laborers, they must be American citizens, loyal to America and American ideals and all they stand for, before they can hope for positions of responsibility and trust. We determined to make the prerequisite of success in this institution American patriotism and American nationalism. We will employ foreign born men, but it shall be understood that their only hope for advancement and preferment lies in their speedy adoption of American citizenship and the fore-swearing of allegiance to other lands. And we feel that if throughout this nation commercial and industrial success depended on a prerequisite of American loyalty and patriotism, the country would be better off, its factories would have far more efficiency and the workmen would be better satisfied and happier, with old country feuds and bickerings forgotten and superseded by a thorough Americanism."

Secretary Lane addressed every American and especially every employer of foreign labor when he said:

"We are making a great experiment in the United States. Can we gather together people of different races, creeds, conditions and aspirations, who can be merged into one? If we cannot do this we will fail. If we do this we will produce the greatest of all nations, and a new race that will long hold a compelling place in the world. It is well, therefore, that we come together at such times of stress as this, and we should have come together long since and put our heads to the problem as to what are the initial steps in bringing about that harmony within our country which will give it meaning, purpose and cohesion."

The resolutions adopted by the Americanization Conference, following these words, show that the practical men whom Secretary Lane addressed were convinced that the industries should do their share of Americanization work. They call for:

1. The adoption of the policy that the Federal Government should cooperate with States and through the States with the local communities in carrying on an extensive, intensive and immediate program of Americanization through education, especially for non-English speaking foreign-born adults.

2. That the industries employing

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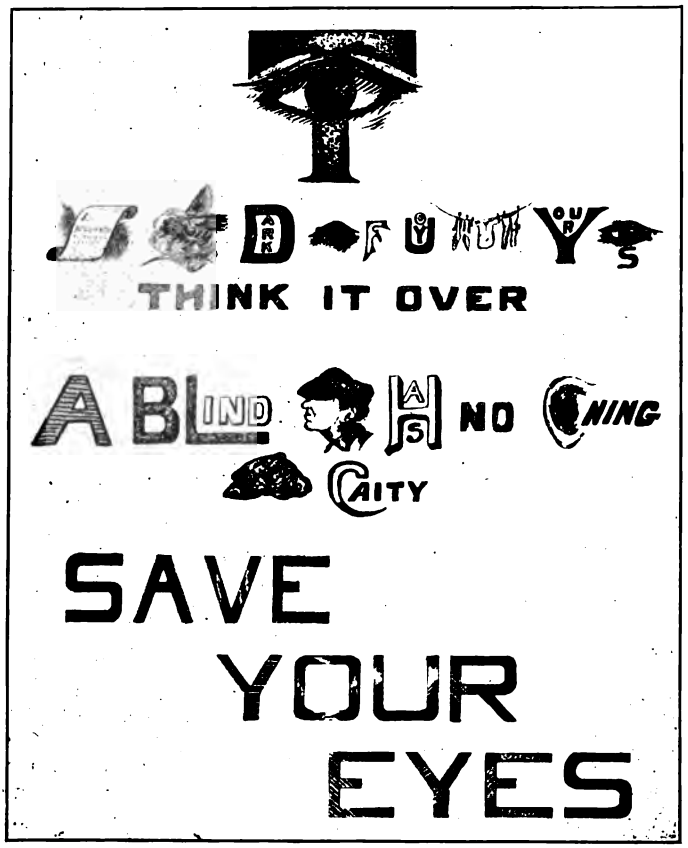
large numbers of non-English speaking foreign-born persons should cooperate with local communities, State, and Federal governments in carrying out this proposition.

3. That adequate appropriations should be provided by the Congress to be expended through appropriate Government agencies for the foregoing purpose.

4. That in all schools where elementary subjects are taught, they should be taught in the English language only.

"It Will Be Dark If You Close Your Eyes; a Blind Man Has No Earning Capacity"



SAFETY ENGINEERING is indebted for this rebus to F. H. Babcock, safety agent, Pittsburgh & Lake Erie R. R. Mr. Babcock's work for safety is always original and striking. In order that no reader may lose valuable time in solving the rebus, the correct solution is printed above the picture.

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EDITORIAL

Must Become Americans

UNTIL quite recently the American people have concerned themselves very slightly, in some respects, regarding the foreign born population; that is, the degree of their attachment to the countries of their birth, whether they pay proper respect to American institutions, whether they exert themselves to assimilate with the people among whom they have come to live or whether they elect to flock by themselves in "foreign colonies." Uncle Sam has been a very lenient and tolerant host. He has permitted the strangers within his gates to go their own way unmolested. He has made it easy for immigrants to continue to speak their own languages and to earn American dollars in abundance, though they remain hard-shell aliens. Of course, the public schools of America take care of the children born here—they are Americans always. But the fathers and mothers who have transported themselves from countries across the sea, have, in a large measure, remained pure foreigners. One effect of the war will be to modify, very materially, the tolerance that has permitted the alien population to live and prosper here without feeling any obligation to learn and speak the English language. The Americanization Conference, very sensibly, is leading a movement to require speedy Americanization as the consideration for a hearty welcome to America. Some of the largest employers of American labor announce that they will continue to employ foreigners, but the advancement of foreign born employes will depend upon the adoption of American citizenship, the acquisition of the American language and loyalty to American institutions. This is no more and no less than plain common sense. The foreigner who comes here to make this country his home should cast off alien ideas and associations and make himself a good American citizen as soon as the law allows.

The Fire Prevention Movement

THE proceedings of the 1918 meeting of the National Fire Protection Association, in Chicago, constituted a report of progress in popular education in fire prevention—to save life and to save property. In the resolutions adopted the first recommendation was that standard building codes be adopted in every municipality to the end that fire-resistive building construction may be encouraged, the use of inflammable roof coverings prohibited, adequate exit facilities from buildings assured, and interiors so designed and fire-stopped as to make easy the extinguishment of fires therein. The association asks the people of the United States to help it in the dissemination of its valuable literature and in the use of the standards of fire protection so carefully worked out by its committees to the end that the lives and substance of our people shall not continue to be dissipated by a reckless and easily preventable waste.

In the June number of SAFETY ENGINEERING, the proceedings of the Chicago convention will be discussed, point by point, bringing down to date in an analytical report the work of fire protection engineers in the important directions in which they are engaged at present.

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all industries to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Permanent Salaried Secretaries

THE National Safety Council has organized 46 branches or Local Councils. Some of these locals have been active for more than four years. The movement is growing rapidly and every city and town in the United States eventually will support a safety organization to protect the lives and limbs of its citizens. Safety is largely a humanitarian problem and requires cooperative social effort. The interchange of experiences between locals through the national organization has been very successful in promoting interest in the work. The most recent development in the management of local councils has been the appointment of permanent salaried secretaries for the Western Pennsylvania, New England, St. Louis and Buffalo local councils. The scope of the work has grown to such an extent that the services of the most capable and productive type of safety engineer is necessary to attend to the many duties incident to the arranging for meetings, conferences, inspections, safety classes, etc. Members of local councils are quite willing to pay small extra dues to secure these services. The locals are still directed and guided by leading business men of the communities. The principle of collective effort must always prevail, but the detail and practical work must be placed in the hands of an expert engineer. A secretary on the job every day insures success.

Steam Railroad Safety

AT a recent meeting of the executive committee of the Steam Railroad Section of the National Safety Council, Chairman J. T. Broderick of the Accident Causes Committee, exhibited a report showing in detail the 10 most prolific causes of injuries in the transportation, maintenance of way and mechanical departments.

Chairman R. S. Jarnigan of the Grade Crossing and Trespassing Committee reported that all city ordinances and rules of various public service commissions and laws that have been passed during the previous year had been assembled and a full report will be given at the annual congress next Fall. Mr. Dow of the New York Central Lines will supply the Council with sufficient copies of their grade crossing poster to send to certain executives of each State.

Chairman Switzer of the Accident Remedies Committee reported that his committee was making important studies of certain classes of accidents and would report its findings at a later date.

The Publicity Committee, of which Mr. F. A. Wightman is chairman, reported that quite a number of new bulletins are now being printed for distribution among the members.

Chairman George L. Wright of the Program Committee reported that practically all speakers at the next Congress had been selected and their subjects assigned.

Chairman Bell urged that the various subcommittee chairmen complete the selection of their committees, and that they get together as often as possible for the purpose of transacting any business.

H. W. Belnap, manager of the Safety Section, Division of Transportation, United States Railroad Administration, attended the meeting in the afternoon for the purpose of outlining the relation of the safety section to the individual railroads and what he proposes to do in carrying on the work of his department. Under the plan of organization for the safety section, it is the

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purpose of the manager to appoint sectional representatives to supervise the safety work on all Class I railroads at the beginning. These regional supervisors are to be located at points where regional directors for the roads are now stationed, and shall be under the directorship of the manager of the safety section. The regional supervisors will keep in close touch with the officials in charge of safety work on the various railroads, and by this means enable the manager to direct the work on the most efficient basis.

Private School Fire Hazards

BY an amendment to subdivision 2, section 21, article 2, chapter 12 of the code of ordinances, adopted by New York board of aldermen, December 18, 1917, and effective January 7, 1918, private schools are exempted from interior fire alarm systems required by the fire commissioner. The words "or private" are omitted before the word "schools," so that the subdivision now reads:

"2. Interior fire alarms. In every hotel, lodging-house, public or private hospital or asylum, department store, and public schools, there shall be placed and provided, when required by the fire commissioner, an adequate and reliable electrical or other interior alarm system, to be approved by the said commissioner, by means of which alarms of fire or other danger may be instantly communicated to every portion of the building. The fire alarm, apparatus and all other appliances placed or kept within any of said buildings for the purpose of preventing or extinguishing fires, or for affording means of escape therefrom in case of fire, shall be kept at all times in good working order and proper condition for immediate use, and any member of the uniformed force or authorized representative of the fire department may enter any of the said buildings at any time, for the purpose of inspecting such apparatus or appliances."

This seems to signify that in New York City it is not deemed necessary to give the same degree of protection to pupils in private schools as in the public schools. Yet the public schools are supposed to be fireproof and have, at least, comparatively safe exits.

Ignorance and Chance Taking

MARCUS A. DOW, general safety agent of the New York Central Lines, speaking before a safety rally in January, stated that 22,000 people are killed annually and 500,000 injured in industrial accidents, a large percentage of which could be prevented through education and the development of habits and practices of safety. Many industries, said Mr. Dow, including the railways, employ every known mechanical means to safeguard the people, but the protection afforded by valuable mechanical devices is diminished by the ignorance of the public and the inclination to take a chance.

Tests of Safety Apparatus

J. I. BANASH, for eleven years actively engaged as engineer at the Underwriters' Laboratories, Chicago, in the examination and testing of hazardous appliances, has been appointed engineer-in-charge of the casualty department. He succeeds S. V. James, who is now mechanical engineer on special research work at the laboratories.

Mr. Banash is a graduate of the Massachusetts Institute of Technology, a member of the American Society of Mechanical Engineers, the National Fire Protection Association, the National Welding Council, and the International Association of Fire Engineers. He has done much work with committees of these associations in preparing specifications for the manufacture, use and maintenance of appliances involving fire and accident hazards with the end in view of reducing these hazards.

The variety of appliances submitted to the casualty department is a matter worthy of note: goggles for many purposes, including those for welders, ladders, guarding devices for power driven machines, elevator safeguarding

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appliances, shaft couplings, locking devices, anti-slip treads, scaffolding machines, window-washers, safety belts, etc. The experience which Mr. Banash brings to the department will be of special advantage in meeting the problems of devising test apparatus and standardizing test methods frequently difficult and complex.

American Lithographic Company

THE meeting of the department managers and their subordinates and the "First Aid" Organization of the American Lithographic Company was held on Thursday evening, May 2, at the American Museum of Safety, to honor the "First Aid" Attendants who were presented with certificates of merit, having passed the examination for qualification of such in a special course of instructions given by the company at its plant under the direction of G. Haustein, Jr., safety engineer.

The usual dryness of general meetings with safety and welfare as the topic of discussion was eliminated. Mr. Haustein was brief in his opening remarks, explaining the purpose of the meeting, leaving the oratory to the selected celebrities, with introduction of M. Saunders, manufacturing director of the plant, as chairman.

Mr. Saunders spoke of the progress made in the "First Aid" and welfare work during the life of the company, and congratulated the class on its wonderful showing in having passed examination with a 100 per cent rating.

Mr. Wilson of the American Museum of Safety responded to the chairman's introduction, explaining the purpose of maintaining the Museum of Safety, and extending a hearty welcome, with apologies for Mr. Young's inability to attend. His remarks included an interesting talk on the necessity of co-operation on the part of all concerned in establishing and perpetuating a safety and welfare organization to do the work and derive the benefits bound to result from a well meaning and working organization. He referred to statistics showing the death and accident ratio in this country for the period of one year, a record which is appalling and must have awakened those in attendance to the necessity of careful practices and proper machine safeguards to guard against this waste of human element.

Dr. Ransom J. Parker, plant surgeon of the American Lithographic Company, who served as lecturer of the "First Aid" class, followed with an interesting talk on what the duties of "First Aid" attendants consisted of. He emphasized what a "First Aid" attendant should not do, cautioning the class against suffering a "rush of certificates to the head," and being carried away with any idea that a "First Aid" attendant's certificate of merit was a degree permitting the practice of medicine or surgery. He concluded with a brief talk on plant sanitation, requesting the co-operation of the "First Aid" representatives throughout the factory in referring employes suffering from physical ailments to the hospital room for examination. He congratulated the class on its splendid showing, and assured the members that his duties were a pleasure during the course of instructions.

Dr. Edgar B. Armstrong, medical director of the Allied Mutuals Liability Insurance Company, who acted as examiner of the class, was the next speaker. He referred to the report made by Mr. Saunders in his opening remarks in which he referred to 779 treatments being rendered through the "First Aid" division during a working period of 56 days, stating that the showing was remarkable and proved the necessity of an organization of this kind in all industries carrying on manufacturing. He told of horrible cases of infections he was caused to handle through employes neglecting minor injuries which are referred to his dispensary for treatment. He assured the class that he was proud to be the examining physician of a class so well versed in the subject of "First Aid" to the injured, after which he made the presentation of certificates to all attendants.

An agreeable surprise was afforded

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by the chairman in announcing the presence of Gustave Buek, one of the directors and founders of the American Lithographic Company, who responded to the chairman's request for a few words with congratulations to the class on its wonderful showing. He expressed his surprise at the work going on in the factory unknown to him, giving assurance of greater activity along these lines on his part in behalf of factory welfare, and asked the "First Aid" Organization to call on him at any time he could be of service.

The chairman then announced that the film entitled "The Outlaw" would be shown and expressed his appreciation to all who attended and participated, and to the Liberty Mutual Insurance Company for its kind appreciation of the film, closing with the assurance that he felt honored in being chosen chairman at so splendid a gathering, and was indeed proud to be a member of a company so broad and generous in the support of such wonderful work. He congratulated Mr. Haustein, Jr., on his activity in bringing about the results shown through the records of the company and in his entire success in arrangements of the meeting, which he assured him far exceeded his expectations; so much so, that he expressed regret in not seeing a larger representation of executives.

The "First Aid" class, conducted privately under the auspices of the American Lithographic Company, by consent of the Society for Instructions to "First Aid" to the Injured, was composed as follows:

Medical instructor and lecturer, Ransom J. Parker, M. D.

Superintendent of class, Gustave Haustein, Jr., safety engineer of the company.

Employes selected by their department managers: Armand Moreda, Henrietta Miller, Raymond Powers, Arthur Yoos, Helen Browne, Louise Ernst, Henry Rauch, Anna Reves, Jack Wassin, Pauline Mauer, William Garvin, William Walz, Charles Cerutti, John Bergman, John Hoffman, Mrs. E. M. Birdsall, John Winters, Benjamin Bogart, Felix Covant.

United Alloy's Safety Work

ORGANIZED safety work in Ohio is resulting in a decided victory against dangerous accidents and death in industries of the State, according to Victor T. Noonan, director of safety for the Industrial Commission of Ohio. The United Alloy Steel Corporation is one of the large industries of the State which shows excellent results because of its safety campaigns. A reduction in 1917 of 50 per cent in time lost due to accidents is the record of the United Alloy Corporation.

Chlorates and Their Dangers

THE National Board of Fire Underwriters is distributing a pamphlet on "Chlorates," prepared by F. M. Griswold, general inspector of the Home of New York. He calls attention to the fire and explosion hazards arising from the increasing use of chlorates, the recent disastrous fire in the Jersey City warehouse being attributed to this cause. The new federal explosives law specifically includes the chlorates as subject to its regulations.

Patriotic Fire Prevention

THE Patriotic Fire Prevention Congress, under the auspices of the Industrial Commission of Ohio and the Department of the Ohio State Fire Marshal, is to be held at Memorial Hall, Columbus, June 11 to June 14. The sessions will be opened by brief addresses by Governor Cox of Ohio, Mayor Karb of Columbus, and Secretary Wilson of the Labor Department, Washington. Other speakers who are expected to address the congress are the following named: Hon. Lewis J. Bryant, commissioner of labor, New Jersey; Powell Evans, chairman Fire Prevention Committee, Chamber of Commerce, Philadelphia; Captain J. J. Conway, Cincinnati Salvage Corps; Dr. H. H. Brown, U. S. Bureau of Agriculture, Explosives Section; Charles E. Meek, American Exchange Bank, New York City; I. G. Hoagland, New

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York City; W. H. Merrill, Chief U. S. War Industries Board—Fire Prevention Section; W. E. Mallalieu, National Board Fire Underwriters; T. Alfred Fleming, State fire marshal of Ohio; T. P. Kearns, chief factory inspector, Industrial Commission of Ohio; Victor T. Noonan, safety director, Industrial Commission of Ohio.

Loss of Wages by Drink

ACCORDING to the *Scientific American*, a large manufacturer recently protested against the re-licensing of saloons in his town on the ground that the loss of wages on account of drinking averaged $180 per man, and that the total loss for that town could be conservatively estimated at $100,000 a year. These figures were arrived at through a study of the record of 100 men, half of whom were average drinkers, the other half, total abstainers. Injuries were found to be more frequent among the drinking men.

"The Watchman Evil"

THE Independence Bureau of Philadelphia is calling "The Watchman Evil" to the attention of its clients. The watchman, the bureau says, is "The lookout at the bow, the sentry on outpost." In urging its clients to employ efficient watchmen the Independence Bureau continues:

"Much too often we find the watchman list a pension roll. How many arms and legs per man does *your* force average? Men should be retired from watchman service to plant jobs rather than *vice versa*. The property should not be left for 16 out of every 24 hours in the sole charge of men no longer deemed competent to hold even minor jobs as workmen. Not long ago a bureau engineer and the assistant superintendent of a plant in a town guarded by militia, by a detective agency and by numerous private plant watchmen, approached the plant at nightfall, conversed freely with various guards to whom they were unknown, and finally broke into the plant three times at three different points, eluding guards and night workers without difficulty and penetrating to the heart of the plant each time. Unfortunately, this is by no means an isolated experience. Do not assume that your watchman system will take care of itself. It needs constant supervision. Some things can be half-done and be half-good. A watchman system half-done is no good."

Inflammable Materials in Pockets

THE April number of the General Chemical *Bulletin* notes that the overcoat pocket of Luther Silcox was once a storehouse of matches, invitations and other inflammable materials, until one night recently when the elder Mr. Silcox, coming into the room to inquire if Luther was at home, pushed the door back against the overcoat, which was hanging on the door, the exact contact of matches and door being in the crack of the door. The combination of inflammables could no longer dwell peaceably together, with the result that Mr. Silcox carried his arm in a sling, and suffered no little pain from his burns, while Luther lost about $50 worth of clothing.

Obtaining Safety in Mines

FOLLOWING is an account of a safety plan that was inaugurated by an Illinois mining company:

When an assistant mine foreman made the rounds of his district, he carried with him a report of the mine examiner (fireboss), who covered his section, showing all the places where loose slate or rock or other dangerous conditions existed. He also had a blank form, which he filled out as he came to these unsafe places. On his arrival at a room or heading, he would look around for the fireboss' danger mark and then investigate to discover if the miner had taken down the loose slate or rock, or had timbered the place so that it was safe to work in.

If the place was safe, the assistant foreman would pull out his watch, note the time in the blank form and state that the miner had made the place safe. The

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form was then sent to the main office and placed on file.

After the company put this plan into effect, many of the miners who were known to be careless would make their places safe before they would do anything else. These men were afraid the company might use the assistant's filed report as evidence against them in case of an accident.

There was not a single instance recorded of a place that was not made safe by the time the assistant made his rounds, and there were fewer accidents.

Numerous Accidents at Home

ACCIDENT insurance claims paid in 1917, by the Travelers Insurance Company included 3,102 cases of accidents "at home," for which the company paid $321,849.45. The detailed statistics:

	No.	Amount
Burned to death in burning house	3	$19,875.00
Scalded and burned while cooking, etc., cleaning	131	5,856.84
Burned while lighting cigar, etc.	60	3,121.62
Injured while working around barn, shed, etc	470	35,391.72
Falls on stairs	287	62,001.97
Cutting corns, toe nails, finger nails	59	2,268.36
Shaving	68	6,477.99
Slipped in bath tub	58	2,915.93
Slipped on rugs, floor, etc	117	8,806.83
Falls from chairs, tables, etc	50	3,883.40
Run into beds, bureaus, door, etc.	120	8,762.18
Cut on bottles, sharp instruments, etc.	408	15,222.57
Slips on lawn, etc	236	15,177.01
Falls from ladders	63	5,389.96
Foreign particles in eye	54	8,276.94
Hit by falling objects	93	3,547.91
Getting in and out of bed	20	871.05
Poisoned or infected	144	65,734.95
Finger caught in door, etc	59	2,628.49
Stepped on broken glass, sharp instrument, etc.	86	2,557.33
Carving	3	49.65
Pet animal bites, etc	38	1,220.33
Carrying children — finger in eye, etc.	20	541.35
Lifting and moving articles	149	6,364.01
Miscellaneous	306	34,906.06
Total	3,102	$321,849.45

Twelve Lectures on Safety

W. R. RASMUSSEN, secretary in Pittsburgh for the National Safety Council, is delivering a series of free lectures, on successive Monday evenings, at the Carnegie Institute of Technology. The first lecture was on May 13. Subjects of the lectures:

1. The personnel of a successful safety engineer and what he must do to get the co-operation of every employe.
2. Safeguards illustrated with slides and a few fundamentals a safety engineer must know.
3. How to reach the manager and superintendent.
4. How to get co-operation from the general foreman.
5. How to get co-operation from subforemen.
6. Bulletin boards and their relation to safety.
7. Workmen's safety committees and meetings.
8. Instructing new men and getting co-operation of older employes.
9. Labor turnover in relation to safety.
10. Plant conditions, such as cleanliness and orderliness.
11. First aid.
12. General outline of details of a safety engineer.

Quietude and Safety

W. H. CAMERON of the National Safety Council says: "A noisy department in a plant often shows a high accident rate because orders are misunderstood, and signals and warnings are missed. New men are often confused by the clatter and rattle; and this in part accounts for the large number of accidents to 'green' men. Experience proves that as noise is overcome the accident hazard is reduced."

The Marathon *Safety Bulletin* says that the truth of the foregoing was clearly demonstrated a short time ago in the machine room of the Marathon paper mills, in which room are placed the paper machine, beaters, small kidder and super calenders. One of the super men was changing a roll and was caught be-

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tween the platform and the roll on the pivoting shaft. A warning was shouted to him, but owing to an unusual amount of noise, commands, etc., about the room, which happened to be undergoing a change in grade at the time, the warning was unheard, and the man received a severe injury. Under unusual noise conditions the best thing to do is to omit all shouting, whistling and unnecessary dropping of things on the floor.

Every Day Advice

THE Cudahy Packing Company is doing good work for safety. Mr. Rispalje, safety director at Sioux City, Ia., is responsible for this poem:

He started for his work,
Whistling, blithe and gay,
And he was full determined,
To do his bit that day.
And on his lips he felt his
Wife's and babe's warm kiss,
And he looked so straight and tall,
About—

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Before the day was over
He got careless in his ways,
He should have known lots better,
For, you know, it never pays.
And now he never feels
The thrills of joy or bliss,
For he has to spend his life

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And his family never knows
One-half the joys of living;
For each one has to hustle,
To make what he'd been giving,
With father helpless as he is,
His earnings now they miss.
And every day they file to work—

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So you must be very careful,
And start each morning right,
And give carelessness, your enemy,
The hardest kind of fight.
So pay good heed to *Safety Hints*,
So never a point you miss,
Or you will wear a monument—

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Put the "I" in Think

THE policy of "Safety First" has done much to eliminate accidents on the Santa Fe system, according to Isaiah Hale, safety commissioner of the railroad. Various methods are used by the Santa Fe to teach both its employes and the public the value and necessity of precaution.

"Help put the 'I' in think" is one of the latest slogans being used by the road to emphasize "Safety First."

Street Accidents in Winter

DETAILED accident tables compiled by the Bureau of Statistics of the Police Department, New York City, for the month of December, 1917, show that there was less snow in the aggregate than in December, 1916, but that it lay on the street about three times as long. The result was that fewer persons were hit by automobiles, namely, 334, compared with 394 in 1916, showing that when pedestrians are compelled to keep to the crosswalks accidents are greatly reduced. The total number of vehicular accidents decreased to 1,141 from 1,427. The total number of persons killed or injured decreased from 1,950 to 1,701—33 were killed, as compared with 35 in 1916.

The number of falls on streets or sidewalks increased to 414 from 331. Only 16 of these falls were attributed to defective pavement, compared with 37 during December, 1916. In 111 cases the person

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who fell was seriously injured. Slightly more than half of all who fell were women. Only 14 falling children were reported, but 68 men and 76 women over 50 years of age were noted by patrolmen. The changes in general location of the December accidents are significant:

General Location.	1917.	1916.
At cross walks	396	397
At safety zones	3	4
At car stops	10	17
One-way streets	11	8
In front of schools (children only)	5	0
Street intersections	245	326
On streets other than above	574	781
On bridges	19	19
On sidewalks	313	248
Total	1,576	1,800

Power House Lighting

THE construction department of the Consumers' Power Company has given considerable thought and study to determining the most satisfactory lighting system for the power-house. The results obtained from their experiments were used in a new lighting scheme installed at the Battle Creek, Mich., steam plant, and were so satisfactory that this has been adopted by the company as a standard of power-house lighting. The installation in the turbine room before the change consisted of

48— 60 watt lamps	2880	watts
3—500 watt lamps	1500	watts
16— 60 watt lamps	960	watts
Total	5340	watts

After the change of

34—200 watt Type C mazda lamps	6800	watts

This gives an illumination of 3.34-ft. candles, which is within the range recommended for this kind of installation, and, furthermore, the installation has proved highly satisfactory in operation. The lamps are spaced equally over the 10,812 square feet of area in rectangular squares 21 feet by 17 feet, and are mounted 33½ feet above the floor.

"Safety First" Is Garage Motto

THE manager of an Albany (N. Y.) garage company believes that the most important of the many desirable things a garage should be is safe.

"The supreme importance of safety can be understood when you think that there are few single possessions of the average family that cost as much as its motor car. A residence cannot be stolen, seriously damaged by incompetent help, nor is it subject to unusual fire risks. On the other hand, an automobile, costing a good fraction of a moderate priced home is open to all three dangers unless safety is the motto of the garage in which it is kept. To my mind, one of the best fire-prevention measures is the simplest of all. It is just plain cleanliness and neatness around the place. We do not allow rubbish, paper, oily rags or other refuse to accumulate even in the less frequently used parts of the building."

Tar Oil Explosion

A TANK car containing coal tar oil was placed on a shop track on account of leakage which it was found could not be stopped by repairs. It was arranged to transfer the contents and the man selected for the work was aware of the danger and had been warned to keep lights and fire away. The contents were transferred by pumping and when the pump stopped the man climbed on top, and believing the tank empty, thrust a lighted lantern in the dome. The vapor was ignited and flashed up and the workman was badly burned. He knew better but failed to act according to his knowledge.

"Strike Anywhere" Matches

THE improper loading of a shipment of fifty fiber board cases of strike anywhere matches in the end of a car instead of near the doorway, and failure to load other heavy freight so that packages could not fall on or injure the cases of matches resulted in a fire that destroyed the car and contents, in transit, with a loss of $3,000.

Responsibility of the Foreman

THE able men back of the safety movement realize that accident prevention is an important part of our industrial life, and that the plants which have made the best records have been those which have been most successful in enlisting the co-operation of the foremen. Avoiding accidents

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to men and to equipment is quite as important as having machinery in proper shape and having men trained to perform their assigned work. The close relation of safety to low labor turn-over and to efficiency should make accident prevention appeal more to the foremen than the humanitarian value of accident prevention and money that may be saved by work along these lines. The plant management looks to the foreman to put forward safety. He is the keystone in the safety arch. The safety of the workmen, in fact their lives, is largely in his keeping.

Rabbit's Foot for Luck

A BULLETIN from the far west directed to auto drivers starts off with, *"A Rabbit's Foot for Luck.* John L. Sullivan gave Theodore Roosevelt a gold mounted rabbit's foot for luck. Roosevelt carried it over African game trails, but he also carried a medicine chest and boiled all his drinking water. He didn't trust to luck." This is only the introduction to several don'ts for drivers. "Safety should be your first thought; the speed limit your second." "The pedestrian has a right to assume that you will give him a safe crossing." "Test your brakes and steering gear." "Don't turn corners at high speed or run fast on slippery pavements."

Ounce of Prevention Pays

A MEMBER of the National Safety Council, employing many workmen, reports an interesting innovation in his efforts to reduce accidents to workmen:

"The foreman is required to fill in, sign and file with the employment department a certificate stating that he personally has provided a suitable and safe place in which to work; has inspected the machinery and apparatus to be used, and has found them safe and suitable for the work in hand; has explained the company's rules and regulations for employes engaged in such work; has given express orders never to clean gears, belts or moving parts of machines while in motion, and has acquainted the fellow workman selected to teach the new employe with the latter's inexperience and has instructed him to point out the dangers incident to such work. Special care is taken to give such instruction in the new employe's own language — through an interpreter, if necessary, whose name must be given. Such fellow workman is also required to fill in, sign and file a somewhat similar statement as to his own personal responsibility. These certificates are filed with each workman's employment record."

Taking time by the forelock has well repaid the company. About 70 per cent of the number of former accidents has been wiped out, wages have increased, savings have taken a strong upward trend and a general better feeling prevails.

"Stopper Out of Carboy"

IN transferring a shipment of sulphuric acid memorandum was noticed on the waybill reading, "Stopper out of carboy and acid over car floor," so attention was called to the necessity of handling the carboy carefully, but when it was lifted the bottom fell out of the box due to the action of acid on the nails, and the carboy fell to the platform and broke, burning three of the workmen badly. The value of the carboy and acid was only $5.78 but the railroad employes were incapacitated for a long time. Had the regulation prohibiting the forwarding of packages containing dangerous articles in an insecure condition been complied with this shipment would not have been allowed to go forward until a proper stopper was secured.

Lime, Coke and Ashes

THE Bureau of Explosives has been appealed to in an effort to bring to the attention of officials and employes the requirements of regulations providing that lime, coke, ashes and similar substances must not be loaded in cars until thoroughly cool.

Many fires are recorded due to hot

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loading of ashes and cinders, resulting in great loss to railroad equipment. "Save and Serve" is the slogan now, and this should be particularly heeded by railroad men, so as to prevent fires and save cars. Cars are greatly needed now and care should be exercised so as to prevent their being withdrawn from service by reason of preventable fires. Ashes or cinders must be thoroughly drenched or cooled before being loaded in cars. It is necessary that instructions be issued and carried out to prevent the loading of cars with articles in such a hot condition as to set fire to them!

More Preventable Accidents

THE United Gas Improvement Company of Philadelphia, cites the following: A man tripped over a drip box and sustained severe lacerations and a possible fracture of the hand. The drip box should have been made flush with the pavement. Two boys "hitched" to a delivery truck in order to save carfare. One fell off and is now nursing a broken arm. The sum for medical expenses exceeded the cost of carfare for a period of three years. What kind of saving is this? A dislodged brick which had served as a subject for humorous speculation as to when it might fall, did fall suddenly and struck one of the playful speculators on the head. He narrowly escaped a fractured skull. The brick should have been placed where it couldn't fall. No hazard should be considered funny.

Ontario Safety League

FIGURES showing the violent deaths in any city are of great human interest, and the "curve" upwards or downwards is largely indicative of carelessness or caution. Some cities show a steady increase in accidents, and apparently expect a certain ratio of increase to continue. Toronto, on the other hand, had fewer violent deaths in 1917 than in 1912 or 1913, showing that the public has become educated to avoid accidents.

Since January, 1914, the Ontario Safety League has carried on an accident prevention campaign, which has reached all classes. The league now sends bulletins to schools, street car barns, industrial plants, motorists and many others, and the constant repetition of sensible and seasonable warnings has produced the expected result.

Last year the league issued the following large amount of literature, which was distributed throughout the Province:

90,000 cards to drivers of vehicles.
10,000 cards for motorists only.
100,000 letters to parents.
81,000 school bulletins.
64,000 industrial bulletins.
16,000 health bulletins.
28,000 special bulletins.
11,000 electric railway bulletins.
330,000 gummed seals.
1,700 large cards in street cars.
10,000 form letters.
5,000 reports.

The motion pictures now being shown in the Toronto schools should prove a great stimulus to the pupils, as pictures teach their lessons in a way that is impossible with the printed word, and the message of caution will be carried into the homes to multiply there.

Surprise Tests for Trainmen

AS part of its campaign for safe railroading, the Southern Pacific Railroad Company recently conducted nearly 3,000 surprise tests to determine how observing its trainmen were. These tests took the form of the display of danger signals at unexpected places, the manipulation of home semaphores and interlocking signals, removal of markers, extinguished lights, and the display of wrong numbers on caboose and engine indicators.

In every test such as those mentioned, trainmen detected every signal and reported every error. The per cent of efficiency shown by the total of tests conducted on every division was 99.77. The few failures noted were mostly of a technical character, such as the observance of speed regulations and matters which do not involve the immediate element of risk.

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Training School for Women Employes

By C. W. Carpenter

Works Manager, Recording & Computing Machine Company, Dayton, Ohio

Proceedings of Second New York Industrial Safety Congress

THE factory of the Recording & Computing Machines Company has been engaged in the manufacture of the Russian type of combination time fuses. The character of the work is of the closest, the limits running as low as 5/10,000 of an inch. The metals worked are brass and aluminum, the last mentioned being a particularly difficult metal to operate on. The factory employed 8,600 persons, of whom over 5,000 are women. Practically all of the mechanical operations are performed by women, who are doing work of a character that formerly only skilled men operatives were supposed to be capable of doing.

The women employes are made up of many different classes. We have a large number of school teachers, physicians, clerks from stores and girls who have been doing general work. The class of girls is not known as general factory employes.

When I took charge of the works, January 1, 1916, it was the practice to bring the new employes into the shop, set them at the machines, and have them learn the work at the machines. I noticed that when the new girls came into the shop they were very nervous, badly frightened, and that they did not get over this timidity for several weeks. They were set to work at either large or small machines, the like of which they had never seen before, and, naturally, were too nervous to do their best.

I started a Mechanical Training School, located in a well-lighted room, away from the factory, and therein were placed all the different types of machines upon which training was necessary. I placed at the head of this school my most expert mechanic and operator, being particularly careful to select a man who was a gentleman and who could get along with the women. The teachers, however, were in each case women. I selected women so that when the new girl came in she would make up her mind.

The employes were selected with care. Some women were fitted to handle heavy duty machines, while others could handle only the light machines.

The system of teaching was standardized. The teachers handled from two to five girls at one time. The teacher explained the character of the metal and the kind of tools to be used. The new employe was shown what each tool was supposed to do, the machine being operated to illustrate the point. The girls were then permitted to start the work themselves, and each time they made an error, they were corrected in the most kindly manner, and encouraged to do their best. The time required for teaching these operators ranged from three days to three weeks. In from ten days to three weeks' time we turned out from the school girls who could operate heavy hand turret lathes. We demonstrated that strong, healthy young women can do mechanical work, requiring great precision, as well as the most skilled mechanics; in fact, our experience indicates that with the proper method of training, they will outstrip the men.

As an example of what the women can do in assembling, I give you the following data: We have a large assembly department, employing over 2,000 girls. Two prominent former engineers stated that the best output that can be secured from this portion of our plant was 15,000 complete fuses per day in two shifts. *By thoroughly training the girls we have been able to reach an average production of* 35,000 *per day in one shift.*

The training described is only one part of our organized scheme for increasing production. This method includes:

(1) A determination of the average

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production that should be secured from each operation.

(2) A method of training the girls in the school, such as has been described.

(3) A method of continuing this training in the shop.

(4) A system of organization that compels the directing heads to give attention to the poor workers, and so train them to be better workers.

(5) A generous method of pay, which will reward the employes for reaching high marks of production.

(6) A careful system of supervision that will prevent operatives overworking themselves, or straining themselves in any way by attempting to work too hard.

We have covered these points by a system of organization which sets a male job boss over each group of five women, this job boss being selected with the greatest care, in order to see that he is not only a skilled mechanic, but also a man of good character. The job boss's pay depends upon the output of the entire group of girls under him, so that it is to his interest to help the newer and poorer operatives, rather than concentrate on the good ones.

Our bonus system of pay is an original one, and has provided an excellent stimulus to the operators without inducing them to overwork themselves.

In addition, we have, of course, our hospital, nurses, doctors, restaurants, company band, and rest periods, all of which are necessary parts of a well organized system.

We have found it very useful to study operations in which we think the nervous strain is somewhat great, making it a point to change our operators at proper periods, and transfer them around from one job to another, without reduction in pay.

We go to any extreme to keep our people in excellent health and spirits, and we make them feel that we are looking out for their interests, as a matter of justice, pure and simple, an attitude that employes appreciate.

Rubber Glove Evolution

IN the fall of 1915 the seriousness of the question of rubber gloves was brought to the attention of the Accident Committee of the National Electric Light Association. Rubber gloves were being purchased by electrical companies, and in the majority of cases received absolutely no acceptance test; there was no such thing as a standard rubber glove, and the whole question was found to be deplorably uncertain. If an electrical company were guarding a priceless piece of machinery that could not be replaced, is it not reasonable to expect that the guards used would receive most careful inspection and be put through a most rigid test? Linemen and operators are required to work on 2200-volt lines that are alive, and the only way in which they are able to do this work is by wearing rubber gloves and taking other precautions. Having this in mind, should not the company and the employers be very inquisitive as to whether the rubber gloves are safe for the work in hand?

During the year 1915-16, a preliminary series of tests on rubber gloves was carried out and a progress report made at the Chicago convention. In 1916-17 a more elaborate series of tests was carried out, and it is found that more time is needed before a definite report can be made. Some points, however, can be deduced from the work thus far carried on. The standard rubber glove will be for work on lines the voltage of which to ground is not more than 3,000. The gloves are to be made by the dipping process and are to be vulcanized by some other method than the acid method. The gloves should be marked in such a way that they can be easily identified. They should be tested for acceptance by electrical and physical tests, the electrical test to include a voltage test and the finding of the leakage current.

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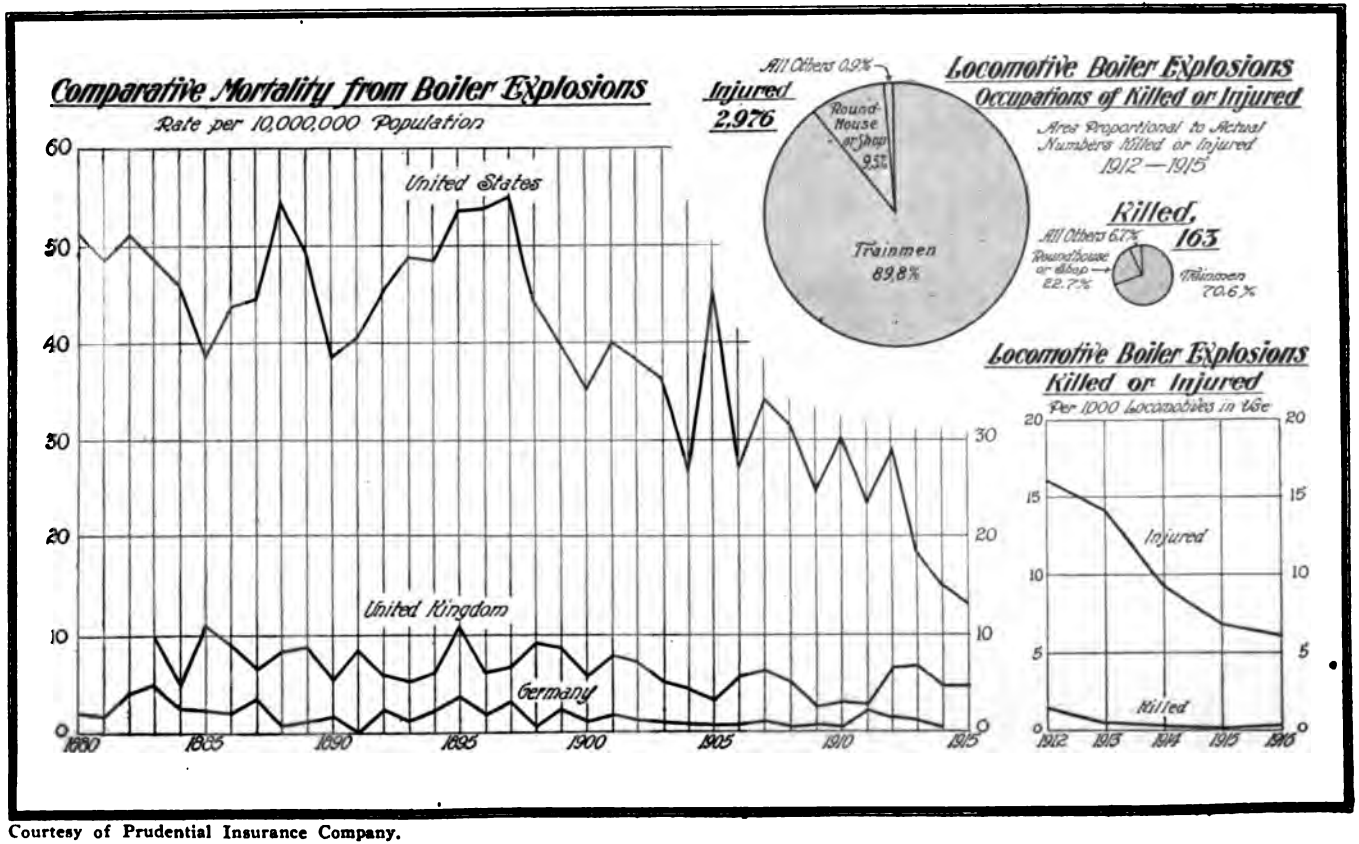
Steam Boiler Explosions in the United States



Courtesy of Prudential Insurance Company.

The Prudential Insurance Company of America, under the direction of Dr. Frederick L. Hoffman, its statistician, has prepared a series of charts of very great value to all persons interested in the prevention of accidents. Through the courtesy of the Prudential, a number of the charts have been published in SAFETY ENGINEERING.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 350 VARIOUS INDUSTRIES—INDUSTRIAL EYE PROTECTION.—Its meaning to both employer and employe needs be studied and understood to prevent the many needless injuries.

Since the "Safety-First" movement is coming into its own, a great number of human eyes are being saved from destruction by the use of proper protection. The manufacturing of industrial eye protectors and goggles has developed into a business of note, with the result that adequate protection may now be provided for almost any kind of industrial eye hazard.

In consulting the Industrial Commission of Wisconsin, relative to eye injuries and eye protection, we learn that there has been a great increase of accidents during the last two or three years, and the increase of eye accidents has kept pace with the general increase in all industries, especially those affected by the demand for war products. It might be possible to show some decrease through the use of eye protectors in individual plants where one could obtain data to compare the experience with and without goggles and where a fair comparison could be made on a basis of exposure to accident hazards. From the reports that are being received by the commission at the present time, it would be fair to say that fully three-fourths of eye injuries

An intelligent heart-to-heart talk will give the men entirely a different view of eye protection and its value

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now occurring could be prevented by the use of suitable eye protectors.

Employers are furnishing goggles to a greater extent now than they ever have done before. However, the workmen do not always use them, and investigation of their failure to use these protective devices often shows that their objections are justifiable, as in many cases the goggles do not fit. The average employer has not as yet given sufficient attention to the problem of eye protection in his factory. This problem of eye protection, as we view it, is one of securing proper protective devices in the first place and, in the second place, of educating the workmen with respect to the use of these devices and enforcing proper discipline to require the workmen to make use of the safety devices when they are properly selected.

In some factories and shops, it has been difficult to induce the employes whose work is dangerous to their eyes to wear goggles and eye protectors. Although workmen do make all sorts of excuses in resenting their use, it is probable that much of this is due to lack of diplomacy on the part of the employers in introducing protectors to their men. Comparatively few people appreciate their eyes, and because of this it is very essential that this be brought to the workmen's attention, advising them that our eyes are the most precious possession we have. If it were not for our eyes, we would be practically helpless. An intelligent heart to heart talk along these lines would give the men an entirely different view and a better opinion of eye protection and its value.

A workman who must constantly be on the alert to protect his eyes from flying particles, extreme heat or light cannot give his whole attention to the work on hand. If, therefore, this fear of injury to his eyes is removed, then is the efficiency of the worker and the quality of his work increased. It is very important that such safety goggles be worn which afford the slightest discomfort, injury to the vision or eye fatigue. This alone should be thoughtfully considered for the reason that the goggle which is worn over the eyes all of the time is twice as protective as the goggle which is left half the time in the workman's pocket or on his bench.

It is very essential that every employer have a general knowledge of the workmen's compensation law. It is noted in the compensation act with 1917 amendments, as published by the Industrial Commission of the State of Wisconsin, that provisions are made whereby an employe whose eye or eyes are injured while in the act of performing duties for his employer is granted a compensation of 65 per cent of his average weekly earnings to be paid for the healing period, subject to provisions made by the State for maximum and minimum payments.

A schedule of fixed benefits was first inserted in the compensation act in 1913 which simplifies the administration of the law and makes it more satisfactory to both employer and employe. The schedule for eye injuries is as follows: For the loss of one eye by enucleation, 160 weeks; for the second eye, 320 weeks; for total blindness of one eye, 140 weeks; total blindness to second eye, 280 weeks.

In the State law, order No. 46 on eye protection reads as follows: "Where men are doing work whereby any substance is thrown off which may injure the eyes, suitable goggles or spectacles or other sufficient guard must be provided by the employer." The compensation law provides for a penalty of 15 per cent where injury results from the employe's wilful failure to use the safety devices provided by the employer, and to obey any reasonable rule adopted by the employer for the safety of the employes. Where properly fitted goggles are furnished by the employers, and where the employes refuse to use the goggles, and are injured, the employe will be penalized 15 per cent in awarding compensation. By the term "properly fitted" is meant goggles which fit comfortably over the nose and around the eyes and lenses are properly spaced for the eyes. There are other minor detailed provisions in the law.

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Statistics of eye accidents, published by the Industrial Commission of Wisconsin, show that from September 1, 1911, to January 1, 1913, a total of 366 accidents were reported, which resulted in injuries to the eyes of workmen. In 24 cases the sight of one eye was lost completely. In 7 cases the eyesight was impaired permanently, and in the remaining 335 cases the injured person was disabled for at least 8 days. Approximately one out of every 25 accidents resulted in eye injury. In certain industries, such as foundries, where a great deal of grinding and chipping is done, the average is much higher.

Eye protection for employes does not only involve the provision of goggles for dangerous work, but may also cover the necessity of providing an adequate lighting system, both artificial and natural. Ida M. Tarbell, writing for the *American Magazine,* says that in a certain plant where an efficient lighting system was installed, the output at night was increased a little over 10 per cent. In order to determine whether this was due wholly to the introduction of the better lighting conditions, the lamps were taken out, and for a time the work was carried on at night with the old lighting system. It was found that the amount of work dropped off over 10 per cent. When, however, the new lighting system was again placed in position, and work was resumed, the men were able again to produce 10 per cent more work. Saving comes almost entirely through the worker. It relieves his eyes, his attention and his fear of accident.

Good wholesome daylight for employes through a sufficient number of properly constructed windows, and a well ventilated work room, makes more cheerful and better producers. An example of this is seen in the "Lensdale Plant," one of the several buildings of the American Optical Company at Southbridge, Mass.

Our great country is now the leading nation of the world in progress. Let us take the best care of our eyes, and the eyes of our fellow men, to make a greater people and a greater U. S. A.

No. 351 ALL INDUSTRIES — SAFETY EDUCATION.—In reducing accidents in the industrial world, I contend that it is not the man at the very top that should be dealt with, but the superintendents of the departments of the different productions.

It has been suggested that if you explain to the man at the top that the accident cost will come out of the net profits secured through production it may be possible to estimate just how much reduction in casualties will offset the accident cost. It has been invariably found that there is a dearth of good statistical information regarding this. It is to be deplored that we are handicapped by a lack of authentic statistical information when discussing accident prevention.

In starting an accident campaign, a method I would suggest, starting at the beginning of the game, is to devise a good system for carrying statistical facts on forms that can be looked at every day or any minute and see where you stand.

If the manager of a department can be shown who got hurt and such elements as may have been the direct or indirect causes of accidents or prevention of them, an analysis of records can be made at any time and remedies can be quickly applied at the places where they are most needed.

There must be a direct head of information to cover all such troubles and discussions to secure reliable information. Such head is the safety engineer or inspector, known as the director of safety.

The easiest way to educate managers would be to have the director of safety, or a good safety man, address them at a meeting. If the manager amply demonstrates that he is interested in the way the men are taken care of when injured, the conditions under which they are working and the surroundings, they will readily see that the executives are sincere in their attitude.

The one basic principle in safety is to convince the workman that he is the man who gets injured and bears the hurt of the accident, therefore he

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must be taught safety methods. The way in which the teaching is carried out is not the one, all important element—it is the result accruing from such teaching.

Good safety committees must be formed. What I mean by good committees is that the committee must be made up of good safety men, who must be so impressed that the more they speak and do for safety the better they will be appreciated. A good safety committee is, to my belief, the best way to instruct the workman in safety.

Where such an organization to produce a safety movement is first introduced by an industrial plant, past accidents and their causes should be referred to. These causes, and such recommendations to prevent accidents as are on hand, should be classed as one and discussed by the head officials and put into force.

Never should an accident, no matter whether small or large, be thrown aside without a thorough investigation by the safety inspector. As each accident is investigated, the direct or indirect cause should be noted. If recommendations to prevent further injuries to workmen by this same hazard are made, they should be enforced at once.

Education could be divided into two forms. Verbal instruction from foreman or safety man, and instruction by bulletins and written matter. Every industrial plant should thoroughly warn and instruct its men, as completely as possible, in accident prevention.

Not only should workmen be cautioned but the managing heads of departments, also.

In our plant we have at the main entrance to the mill a large bulletin board on which is posted the number of accidents, their nature and the standing, in percentage, of each department in the entire mill.

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No. 352 ALL INDUSTRIES—VALUE OF ORGANIZATION IN SAFETY WORK.—To obtain the best results in preventing accidents, organization or team work is essential. The greater number of employes you can get to think and feel, as your safety department does, on the subject of preventing accidents, the greater will be your success.

The amount of your sales depends upon the merit of your selling organization. The success of your safety work will depend upon the merit of your safety organization. No individual or small group of individuals will ever get the utmost out of this movement in a large plant. The services of a great many must be welded together, all working to the same end, and a capable leader must keep everlastingly after his organization lest it become stale.

In our own plant the safety department does not attempt to handle this matter alone. We have solicited the cooperation of every man in the factory organization, from the factory manager down. The General Safety Committee, composed of men in the higher positions, meets weekly. Round table discussions are held for the benefit of all foremen, monthly. Each foreman holds monthly safety meetings in his department for the benefit of his sub-foremen and inspectors. In smaller departments the foremen talk to their workmen. The point in mind is to instill the safety spirit into the hearts of each one of these individuals to such an extent that they are always on the lookout for dangerous practices or conditions which may appear hazardous.

Accident prevention work allows for a great variety of methods. A plan which works out satisfactorily in one plant fails utterly in another. Conditions must be studied, your foremen (the vital factor) must be studied. No two can be brought around to the safety idea by the same methods. Some of them must be coddled, some forced. You cannot afford to have a single knocker in your outfit. Our policy is to get as many men thinking, talking and acting safety as possible. Work with and through the foreman, he is the key note to the whole situation. Without his support you may as well discontinue your efforts.

In addition to this outline of activity, bulletin boards, factory newspapers,

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safety pamphlets, personal instruction to the new employes by the foreman are beneficial.

Too much stress cannot be placed upon the value of educational work, as by these means a far more appreciable reduction will be shown than by 100 per cent installation of mechanical safeguards.

Let me again emphasize the absolute necessity of an efficient organization, which can only be obtained by hard work, and it will take time, but the results will be ample justification for the time spent in forming your organization.

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No. 353 IT PAYS TO ADVERTISE—SAFETY INSURANCE. — The safety engineer in reality is a salesman, he has to advertise his wares. He is selling safety to the "Man On The Job." He has to toot his own horn or he will have a horn that is not tooted. Make a big noise and let the men know that you have the best policy on the market, as the cheapest life insurance is "Safety First"; no premiums to pay and no fear of the policy's becoming void through lack of meeting payments. The only premiums which are necessary are "Carefulness, Watchfulness and Thoughtfulness."

Try out a "Safety First Week" by placarding the mill with large cardboard signs with various safety slogans, posted in conspicuous places, such as "Be a Safe Man." "Remember the Wife and Children at Home—Safety First." "Safety Means Fewer Accidents." "You Have but One Life, Practice Safety First." "Get the Safety Habit Today." "Warn the Other Fellow." "You are Not Exempt from Safety Service." "Avoid Accidents, You Can Do It," etc.

In addition to having "Safety First" weeks you can get the men to think by conducting campaigns on "Clean-up Week," "Sanitation Week," etc., by devoting one week to each subject, making an extensive campaign so that all the men will realize what the movement is for. Try this. Of course, this is to be done in addition to the regular routine work of the safety engineer with a view to arousing enthusiasm among the men.

Prizes for April Articles

First Prize. No. 344. William H. MacMahon, Safety Inspector, Republic Iron & Steel Company, Gilbert, Minn.

Second Prize. A tie. No. 343. John W. Conway, Safety Inspector, Pittsburgh Steel Products Company, Monessen, Pa. No. 345. W. A. Lucas, Assistant Superintendent, Plants A, B, C and E, Butterworth-Judson Corporation, Newark, N. J. No. 349. Edward R. Hunter, M. D., American Red Cross, Washington, D. C.

Other meritorious articles were contributed by Dr. Raymond E. Schaner, Chairman Factory Safety Committee and First Aid Attendant, Harrison Radiator Corporation, Lockport, N. Y.; James A. Bell, Master Mechanic, Illinois Steel Company, Joliet, Ill.; H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Comments by Members of the Committee

My first choice is cast for the writer of 344. The author has the right idea. He states that The Man On The Job is the only man who can prevent accidents. This is very true and the men should use their initiative, which is doing the right thing without being told, and everyone should know when he is performing his work in a safe or unsafe manner. All that is necessary is to *think*. Keep the men interested in accident prevention work, and you will get results. It is necessary to continually hammer home "Safety First" and to change the program from time to time to keep the matter alive. Article 348 is my second choice, "Safe Piling of Material." The proper piling of material is something which must be watched in order to reduce the number of injuries. Reference in the article is made to the point that sufficient space be allowed between bundles, slabs, etc., for the proper attachment of chains. This is well worth considering, for serious accidents have

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occurred through crane chains being partially attached to a second bundle. When the lifts were made the second bundle fell from the pile and caused severe injuries. All material should be so piled as to assure the safe attaching of chains and eliminate the possibility of the second bundle being picked up, when it is intended to convey but one bundle. To avoid obstruction to fire plugs, hose houses, etc., is a good suggestion. In case of fire, quick action by the men is required and proper clearance should be maintained at all times.

My selection is article 346. What the writer explains is a very useful practice. At our plant we are endeavoring to use a similar method, which we find very encouraging. Others should try out the same method in their respective plants.

The author of article 349 has made a suggestion, which if followed out, would prevent a great deal of unnecessary suffering. I think he should have gone further with his suggestion and advocated submitting the human machine to a thorough examination, periodically, to forestall breakdowns—just as we do with any ordinary steam, gas or electrical machine.

Perhaps I will be with the minority in selecting article 347 as deserving first prize. However, I see in this article some display of deep thinking—far below the surface of things. The author has observed the repetition of ideas in various forms in previous articles and has deviated from the usual trend to offer something beyond the ordinary. He is setting forth a splendid idea—one that affords opportunity for consideration, thought and discussion for its development into an effective concrete connection with accident prevention. I would suggest that this author, and others, work out a detailed method for its application, covering all of its possibilities. Let us hear from the girls and the women. Suggest to us how we can help you—through the home—to make safety men of your husbands or sweethearts.

I agree with the writer of article 344, who lays stress on the fact, that The Man On The Job is able to do more than any other person to prevent the majority of our accidents. The habit of taking a chance is responsible for many casualties, and by example and precept we may hope to instill the habit of safety, which pays better than taking a chance.

While article 345 purports to give only a plan of campaign for use in a chemical industry, it is universally applicable and, if carefully carried out and thoroughly followed up, the result will be 100 per cent able-bodied workmen, in place of a force weakened by cripples.

Safe Handling of Acids

COMMERCIAL acids are used in many manufacturing operations and often only small quantities are required. In such cases the principal danger lies in accidentally breaking or upsetting the vessel containing the acid. To overcome this hazard the Westinghouse Electric & Manufacturing Company has originated a container described as follows: The jug fits into a cylinder constructed of fiber or sheet metal and the space between the outside of the jug and the inside of the cylinder is filled in with a tar composition. The jug is thus held securely, and a strong carrying handle is attached.

Safety of Railway Passengers

THE following figures would lead to the conclusion that a railway train is a "safety zone." In 1916, 302 American railroad companies operating 139,000 miles of railroad, which is equal to the combined mileage of France, Russia, Germany, and Austria-Hungary, transported 60 per cent of the country's entire passenger business, and 67 per cent of its freight business without a single passenger being killed in a train accident. In striking contrast to this are the fatalities and accidents to those who ignore the "Safety First" principles practiced by the roads. Almost one-half of such fatalities for 1916 were due to trespassing on trains or tracks, something forbidden by law in Europe under heavy penalties.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

BAKERIES AND CANDY FACTORIES

March 7, 1918. Philadelphia, Pa. Freihofer bakery. Twenty-fourth and Master streets. One 3-story brick building destroyed. Walls, brick. Floors, wood and concrete. Roofs, tin. Cause, overheated oven. Fire started on third floor. Discovered by employe about 4:13 a. m. Alarm, box pulled. Duration, 7 hours. Stopped at second floor. Private fire apparatus, water connection. Persons in building, 30. Means of escape, stairs and fire escape. Value of building and contents not reported.

March 23, 1918. Philadelphia, Pa. Franklin Baker Company. Delaware and Fairmount avenues. Cocoanut products. Two buildings partly destroyed. One 2-story, one 4-story. Walls, brick. Floors, wood. Roofs, tin. Fire started first floor of 2-story building. Discovered by watchman about 6:33 a. m. Alarm, box pulled. Duration, 5 hours. Stopped in 4-story building. Persons in building, 1. Means of escape, fire escape.

CEMENT, TILE AND OTHER KILN INDUSTRIES

February 27, 1918. Greenville, Mich. Belknap Cement Products Company. Washington street, East, near Pere Marquette R. R. tracks. Makers cement block and tile. One 1-story building partly destroyed. Walls, cement and boards. Floors, cement. Roofs, pine shingles. Cause, defective wiring. Fire started at switch block. Discovered by night watchman in gas plant about 2:20 a. m. Alarm, telephone. Duration, 1½ hours. Stopped in same building. Fire was favored by frame uprights. Firemen handicapped by distance from hydrant, and lack of hose connection. Private fire apparatus, none. Value of building and contents, $7,000. Property loss, contents total.

March 15, 1918. Ottumwa, Iowa. Morey Clay Products Company. East end of Grand avenue. Manufacturing of tile, brick, pottery. One 1-story building partly destroyed. Walls, brick. Roofs, corrugated iron. Cause, not given. Fire discovered by workman about 12:15 p. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Firemen handicapped by water pressure. Private fire apparatus, none. Persons in building, 5. Means of escape, ordinary exits. Value of building and contents, $40,000. Property loss, building $8,500; contents $17,000.

CHURCHES

February 17, 1918. Moberly, Mo. West Park Southern Methodist Church. Myer and Dilts streets. One 1-story building destroyed. Walls, brick. Floors, wood. Roofs, shingle. Cause, unknown. Fire started in basement. Discovered by neighbors about 8:15 a. m. Alarm, telephone. Duration, about 2 hours. Stopped in basement. Firemen handicapped by shortage of water. Value of building and contents, $14,000. Property loss, $8,000.

March 4, 1918. Newark, N. J. Park Presbyterian Church. 208 Belleville avenue. Roof and supports destroyed in 1-story church. Walls, stone. Floors, wood. Roofs, slate. Cause, plumber's fire pot. Fire started at cornice of roof. Discovered by plumber at work about 11:20 a. m. Alarm, telephone; also by box in street. Duration, 5½ hours. Value of building and contents, $80,000. Property loss, $47,000, on building and contents.

COAL AND LUMBER YARDS

February 21, 1918. Worcester, Mass. W. H. Sawyer Lumber Company. 66 Lincoln street. Manufacturing lumber. Entire plant (2-story buildings) destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started near barn. Discovered by passersby about 6:40 p. m. Alarm, box. Duration, about 60 hours. Stopped after entire plant was destroyed. Fire was favored by all wood construction. Firemen handicapped by tardy alarm. Persons in building, none. Killed, 1. Injured, about 20 firemen. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $230,847. Property loss, $172,700.

CONFLAGRATIONS

March 4, 1918. Moberly, Mo. Moberly *Daily Index*. Reed and 5th streets. 5 and 10 cent store, Moberly *Daily Index*, furniture store. Four 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, roofing paper. Cause, not known. Fire started in furniture store. Discovered by night watchman about 1:45 a. m. Alarm, telephone. Duration, 2¾ hours. Fire was retarded by fire walls. Firemen handicapped by low water pressure. Value of building and contents, $139,000.

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April 1, 1918. Atlantic City, N. J. 1324-1338 Atlantic avenue. Hardware supplies and paints. Eight 3-story buildings destroyed. Walls, brick and frame. Floors, wood. Roofs, tar. Cause, unknown. Fire started, 1326 Atlantic avenue. Discovered by employe next door about 2:30 a. m. Alarm, telephone and fire alarm box. Duration, 8 hours. Stopped at street end. Fire was favored by inflammable stock; also by archway cut through connecting buildings on second and third floors. Private fire apparatus, none. Value of building and contents, $200,000. Property loss, $119,500.

April 4, 1918. Kansas City, Mo. American Steel & Wire Company. St. Louis avenue and Santa Fe street. Various. Nineteen buildings totally destroyed; 22 partially damaged. Among the heavy losers in the fire were the following: American Steel & Wire Company, 5-story brick building, completely destroyed. Brokers' Office & Warehouse Company, 7-story brick building, fireproof, badly damaged by heat and water; windows on north and west sides broken out. Robertson Transfer Company, completely destroyed. C. A. Murdock Company, completely destroyed. Kansas-Moline Plow Company. 7-story brick building, damaged by heat and water. Brace Clothing Company, damaged. Union Avenue Bank of Commerce, damaged. Ridenour-Baker Grocer Company, fireproof, damaged. Ridenour-Baker Grocer Company, auxiliary buildings, completely burned. Hamm Brewing Company, completely destroyed. Lowe Paint Company, completely destroyed. Brite-Mawnin Grocery Company, completely destroyed. Abernathy Furniture Company, warehouse, completely destroyed. Illinois Glass Company, completely destroyed. Thompson-Munro-Robins Chemical Company, completely destroyed. Collins Bros., Salvage House, completely destroyed. Arthur Bros., saloon, damaged. Jones Lunch Room, completely destroyed. Webb Bros., Manufacturing Company, completely destroyed. Fischer Grocery Company, damaged. Missouri Seed Company, completely destroyed. Great Western Manufacturing Company, completely destroyed. Haysler Iron Company, completely destroyed. Myer Furniture & Supply Company, completely destroyed. The Astor House, hotel, completely destroyed. W. H. Dirck Horseshoeing Company, destroyed. T. Green Grocer Company, damaged. Western Electric Company, slightly damaged; L. D. Crutcher, warehouse. Noon Day Cafeteria. Joe's Cafe. Cause believed to be incendiary. Fire started in building of Abernathy Furniture Company. Discovered by employe about 5:40 p. m. Duration, several hours. The tall 7-story fireproof building of the Ridenour-Baker Grocery Company stood out in the flames like an island. The fire was fiercest directly behind the building, and flames beat against the sides of the building for hours, melting the windows and slightly damaging the rear of the building. The height of the building prevented clouds of sparks carried by the wind from spreading further west and igniting other buildings on the adjoining streets. Firemen handicapped by failure to clean trash from streets which helped to spread the fire. The burning paper was swept under walks and set fire to old buildings far ahead. Private fire apparatus, chemical extinguishers, sprinklers, standpipes. Injured, 8. Property loss, $1,710,150.

COTTON GINS

February 2, 1918. Modoc, Ark. M. B. North. Located outside of fire protection. Cotton gin and grist mill. Two 1-story buildings; gin house and engine room destroyed. Walls, lumber. Floors, wood. Roofs, wood. Cause, unknown. Fire started at night and burned itself out.

COTTONSEED OIL MILLS

February 10, 1918. Conway, Ark. Conway Cotton Oil & Gin Company. Railroad avenue and Mill street. Oil mill and gin. One 1-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar paper and gravel. Cause, match on metal. Fire started in hulling room. Discovered by watchman about 4 a. m. Alarm, telephone. Duration, 1 hour. Stopped outside hulling room where it originated. Fire was retarded by brick partition walls. Firemen handicapped by tardy alarm. Private fire apparatus, 500 feet 3-inch hose attached to hydrant. Persons in building, 1. Means of escape, doors and windows.

DEPARTMENT STORES

March 2, 1918. Kitchener, Ont., Weseloh Goudie, Ltd. 42 King street, East. Department store. One 3-story building partly destroyed. Walls, brick, lath, plaster. Floors, wood. Roofs, felt and gravel. Cause, believed to be spontaneous combustion. Fire started in basement, in rear of store. Discovered by clerks about 9:05 p. m. Alarm sent by messenger. Duration, 4 hours. Stopped at third floor. Fire was retarded by brick walls. Firemen handicapped by poor water pressure and shortage of firemen. Private fire apparatus, none. Persons in building, about 50. Means of escape, front and rear doors, fire escapes. Value of building and contents, $73,000. Property loss, $45,000. Valuable papers and records protected.

DWELLINGS, ORDINARY, CITY

February 26, 1918. Terre Haute, Ind. F. Uncell. 26th and Harrison streets. Dwelling, 1-story, entirely destroyed. Walls, frame. Cause, gasoline stove explosion. Fire started in kitchen. Alarm by telephone. Duration, 1 hour. Burned itself out. The building was situated outside city limits, and burned to ground before arrival of fire department. Persons in building, 3. Killed, 2. Value of building and contents, $1,000.

February 22, 1918. Peabody, Mass. M. Miller. Dwelling and barn, both destroyed. Residence was 1½ stories in height. Walls, wood. Floors, wood. Roof, wood. Cause, unknown. Fire discovered by neighbor ¼ mile away about 11:45 p. m. Alarm, telephone. Duration, 1½ hours. Fire was favored by wooden construction. Firemen handicapped by no available water supply less than a mile

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from fire. Private fire apparatus, none. Persons in building, 9. Killed, 9. Value of building and contents, $2,750. Property loss, total.

ELECTRIC LIGHT AND POWER STATIONS

February 21, 1918. Milwaukee, Wis. A. C. Electric Company. 222-26 Fourth street. Light manufacturing and warehouse. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar roof. Cause, defective furnace. Fire started in 3rd story. Discovered by police officer about 11:49 p. m. Alarm, box. Duration, about 2 hours. Stopped after burning through roof. Persons in building, none. Means of escape, fire escape on south wall. Value of building and contents, about $125,000. Property loss, $25,000.

March 9, 1918. Attica, Ind. Municipal lighting plant. Market street. Electric light plant. One 1-story building partly destroyed. Walls, brick. Floors, cement. Roofs, metal. Cause, unknown. Fire started in attic. Discovered by passersby. Duration, all night. Stopped in building of origin. Private fire apparatus, none. Persons in building, 4. Means of escape, open doors. Value of building and contents, $60,000. Property loss, total.

FOUNDRIES AND MACHINE SHOPS

March 18, 1918. Coatesville, Penn. Lukens Steel Company. South First avenue. Steel plates. One 1-story building completely destroyed, 2 damaged. Walls, frame, brick, tile. Floors, planks. Roofs, frame, and steel with wood covering. Cause, spontaneous combustion in oily steel roll turnings. Fire started in wooden bin where these turnings were stored. Discovered by watchman about 12:25 a. m. Alarm, telephone. Duration, 2 hours. Stopped at punch shop. Fire was retarded by construction of new machine shop, tile and wire-glass. Firemen handicapped by misunderstanding alarm, causing delay in replying. Private fire apparatus hose reels with 2½" hose attached to fire pumps. Value of buildings, $42,000; contents, $78,000. Property loss, $16,000, estimated.

HOSPITALS AND SANITARIUMS

April 13, 1918. Norman, Oklahoma. State hospital for insane. One mile outside city limits. Sanitarium. Three 2-story buildings partly destroyed. Walls, wood. Floors, wood. Roofs, shingle. Cause, defective wiring. Fire started in linen room. Discovered by night watchman about 3:45 a. m. Alarm, telephone. Duration, 2 hours. Stopped at kitchen. Fire was favored by wooden construction. Firemen handicapped by plug being too close to building. Private fire apparatus, chemical extinguishers and hose. Persons in building, 80. Killed, 39. Means of escape, doors and windows. Value of building and contents not reported. Property loss not reported.

HOTELS AND LODGING HOUSES

February 10, 1918. Port Arthur, Tex. Jefferson Hotel. Corner Austin avenue and 6th street. Hotel. One building destroyed. Main building 3 stories in height, 2-story annex. Walls, wood. Floors, wood. Roofs, composition. Cause, unknown. Fire started, rear main building, second floor. Discovered by night clerk about midnight. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Fire was favored by inferior construction. Firemen handicapped by shortage of membership. Private fire apparatus, none. Persons in building, 35. Injured slightly, 3. Means of escape, life-saving nets. Value of building and contents, $26,000. Property loss, $14,000.

February 18, 1918. Paris, Ill. Paris Hotel, and other buildings. East Court street. Seven buildings destroyed. Hotel, 3 stories. Others, 2-stories. Walls, brick. Floors, wood. Roofs, tin, tar and gravel. Cause, unknown. Fire started in hotel boiler room. Discovered by telephone operator about 1:30 a. m. Alarm, telephone. Duration, 9 hours. Stopped at Citizens' Bank. Firemen handicapped by delay in turning in alarm, not reported until fire had 30 minute headway. Private fire apparatus, Seagrave pump apparatus. Value of buildings, $120,756; contents, $110,814. Property loss not reported.

February 24, 1918. Edmonton, Alberta. New Maryland Hotel and Lines Drake, Ltd. Hotel, garage and pool room in basement. Two buildings destroyed. Hotel, 4-stories; garage, 1-story. Walls, brick. Floors, wood. Roofs, hotel, tar and gravel; garage, tin. Cause, unknown. Fire started in pool room. Discovered by hotel clerk about 1:10 a. m. Alarm, telephone. Duration, 29½ hours. Burned out in hotel. Firemen handicapped by fact that many experienced members of department were on strike at the time. Private fire apparatus, none used. Injured, 2 firemen. Means of escape, iron ladders. Value of building and contents, $150,000. Property loss, $150,000.

March 3, 1918. Skowhegan, Me. Hotel Coburn. Corner Madison avenue and Elm street. Hotel and grocery. One 4-story building destroyed. Walls, wood. Floors, wood. Roofs, iron. Cause, probably oil heater. Fire started on fourth floor about 5:40 p. m. Alarm, box. Duration, 10 hours. Stopped on second floor. Fire was favored by construction. Firemen handicapped by poor water pressure and by poor grade of coal for steamers. Private fire apparatus, none. Persons in building, 25. Means of escape, fire escape at rear, large doors in front. Value of building and contents, $60,000. Property loss, $35,000.

MANUFACTORIES, MISCELLANEOUS

February 23, 1918. Bradford, Pa. Vacant factory building. Mill street. Being prepared for occupancy by a company manufacturing oil engines. One 2-story and 3-story building destroyed. Walls, wood. Floors, wood. Roofs, wood and tar paper. Cause, unknown—believed to have been incendiary. Discovered by persons living in next street about 7:50 p. m. Alarm, telephone and box. Duration, 3 hours. Stopped when building was completely destroyed. Fire was favored by all wood construction. Firemen handicapped by low water pressure, but fire had gained such headway that there was no possible chance of

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saving the building when department arrived. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, about $30,000. Property loss, total. No insurance.

February 25, 1918. Kansas City, Mo. American Roofing Company. Southwest corner 12th and Crystal streets. Manufacturers of patent asphalt roofing. One 1-story building partly destroyed. Walls, brick and frame. Floors, wood. Roofs, wood, tar paper, gravel. Cause, leaking asphalt vat in contact with fire. Fire started under vat. Discovered by employe about 10:33 p. m. Alarm, telephone. Stopped in building of origin. Value of building and contents not reported. Property loss on building, $6,227.73; contents, $23,827.36.

March 5, 1918. Tillsonburg, Ont. Huntley Manufacturing Company. West side of Tillson avenue. Manufacturers of elevator and milling machinery. One 1-story building partly destroyed. Walls, frame, metal clad. Floors, concrete and wood. Roofs, tar. Cause, unknown. Fire started west end of main building. Discovered by night watchman about 10 p. m. Alarm, telephone. Duration, 2 hours. Stopped at east end of building. Fire was favored by construction of buildings. Private fire apparatus, chemical engine. Persons in building, watchman. Value of building and contents, $80,000. Property loss, $50,000. All valuable papers and records protected.

March 18, 1918. Lowell, Mass. George L. Cady & Sons. Western avenue. Box manufacturers. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, tar and gravel. Cause, carelessness of smokers. Fire started in cellar. Discovered by employe about 12:22 p. m. Alarm, box. Duration, 6 hours. Stopped in building of origin. Firemen handicapped by canal on one side. Private fire apparatus, extinguishers. Persons in building, 5. Killed, 1. Injured, 3. Means of escape, stairs. Value of building and contents not reported.

MERCANTILES, MISCELLANEOUS

February 23, 1918. Elberon, Iowa. A. M. Trezek. North end of Main street. Hardware implement store. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, tin. Cause, unknown. About 1 a. m. Alarm, box. Duration, 1½ hours. Stopped in building of origin. Private fire apparatus, none. Value of building, $1,500; contents, $5,000. Property loss, total. Records, valuable papers and correspondence lost.

February 25, 1918. Hyde Park, Mass. Joseph E. Farrell Hardware Company. 1285-89 River street. Dealer in hardware, also storage building. One 3½-story building destroyed. Walls, wood. Floors, wood. Roofs, tar and gravel. Cause, spontaneous combustion. Fire started in or near room where oils were stored in 1st story. Discovered by citizen when flames broke through roof about 10:26 p. m. Alarm, box. Duration, 2 hours, 30 minutes. Stopped when building was consumed. Fire was favored by wood construction and large elevator well in center as building was previously used as a carriage factory. Persons in building, none. Means of escape, none. Value of building and contents, $26,000. Property loss, $20,000.

February 26, 1918. Gainesville, Tex. Kress 5 & 10-cent Store. Corner California and Commerce streets, N. W. One building destroyed. 2-story and basement. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in basement. Discovered by policeman, when it spread through roof about 1 a. m. Alarm, telephone. Duration, 6 hours. Stopped in building of origin. Fire was retarted by construction. Private fire apparatus, none in use. Value of building and contents, $80,000. Property loss, $50,000. Valuable papers and records protected in safe.

March 2, 1918. Lawrence, Mass. M. J. Sullivan, Inc. 218-226 Essex St. Furniture store, retail. Four-story building. Walls, brick. Floors, wood. Cause, looking for gas leak with light. Fire started on first floor about 3 p. m. Alarm, telephone and box. Duration, 2½ hours. Stopped at top floor. Fire was favored by construction. Private fire apparatus, none. Persons in building, 15. Means of escape, fire escapes in rear. Value of building and contents, $92,000. Property loss, $47,658.

March 6, 1918. Philadelphia, Pa. Haslet, Flanagan & Co. 131-135 Bread street. Dealers in tinware. One 8-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Fire started in cellar. Discovered by watchman about 2:03 a. m. Alarm sent by messenger to station. Duration, 3 hours. Stopped at first floor. Fire was retarded by construction. Persons in building, 1. Means of escape, outside fire escape.

March 17, 1918. Philadelphia, Pa. J. Wellner. 923-925 Walnut street. Dealer in musical instruments. One 4½-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Fire started in basement. Discovered by citizen about 2:03 a. m. Alarm, box pulled. Duration, 4 hours. Stopped at roof. Private fire apparatus, portable extinguishers. Injured, 2 firemen. Means of escape, outside fire escapes. Value of building and contents not reported.

MERCANTILES, TENANT BUILDINGS

March 12, 1918. Charleston, Ill. Scherer Block. 7th and Monroe streets. Clothing, lodge room, offices. One 3-story building partly destroyed. Walls, brick. Floors, wood. Roofs, reinforced with tin covering. Cause, unknown. Fire started in kitchen. Discovered by janitor about 9:35 a. m. Alarm, telephone. Duration, 3 hours. Stopped at roof. Fire was favored by roof opening that gave draft, with lath ceiling to work on. Firemen handicapped by lack of water pressure. Private fire apparatus, none. Persons in building, 12. Injured, 3, by smoke and heat. Means of escape, stairway and fire escape. Value of building and contents, $100,000. Property loss, $20,000.

METAL WORKERS

January 14, 1918. Akron, Ohio. Ohio Wire Goods Company. 184 North Case avenue. Manufacturing wire goods, cotter pins, etc. One 1- and 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and slate.

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Cause, unknown. Fire started in dry kiln, north side of building. About 12:47 a. m. Alarm, telephone. Duration, about 5 hours. Firemen handicapped by tardy alarm. Persons in building, watchman only. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $86,000. Property loss, $33,000. Valuable papers and records saved. Company gave fire department $50 in appreciation of its service in saving the papers.

February 18, 1918. Detroit, Mich. Detroit Metallic Bed Company. 102-106 Larned street, west. Manufacturing metal beds and furniture warehouse. One 4-story building partially destroyed. Walls, brick. Floors, joisted wood. Roofs, tar (flat). Cause, unknown. Fire started in 2nd story at foot of stairs. Discovered by passerby about 5:41 p. m. Alarm, telegraph. Duration, 6 hours 30 minutes. Stopped after burning through roof of building. Fire was favored by inflammable contents, wood floors and open stairways. Persons in building, none. Means of escape, stairway and fire escapes. Value of building and contents, $96,314. Property loss, $61,840. Valuable papers protected in safe.

MOTION PICTURE FACTORIES AND FILM EXCHANGES

February 22, 1918. Dallas, Texas. Select Picture Company and Standard Film Company, 1919 Main street. Film exchange. One 2-story building destroyed. Walls, brick. Floors, wood. Roof, wood frame with composition covering. Cause, paper lamp shade caught fire and fell on film. Fire started on desk of film inspector on 2d floor. Discovered by girl handling film when it caught fire about 3 p. m. Alarm, box. Duration, about 2 hours. Stopped at same building. Fire was favored because of wooden partitions and floors. Private fire apparatus, none. Persons in building, about 12. Injured slightly, 3. Means of escape, stairway. Value of building and contents, $32,500. Property loss, $5,100.

OFFICE BUILDINGS

March 12, 1918. Springfield, Ill. Dewitt Smith Building. Southwest corner Fourth and Monroe streets. Springfield Consolidated Railway Company and offices. 7-story building partly destroyed. Walls, brick. Floors, block cement and wood. Roofs, tin. Cause, unknown. Fire started in false construction on roof. Discovered by elevator conductor about 12:50 p. m. Alarm, telephone. Duration, 4½ hours. Stopped at seventh floor, under roof. Building was considered absolutely hazardless. Firemen handicapped by having to drag hose up stairways seven floors to fight fire from underneath. Private fire apparatus, hand extinguishers, which were of little use, as the fire occurred underneath the roof. Persons in building, 150. Means of escape, elevators, stairways and fire escapes. Value of building and contents, $160,000. Property loss, $50,000. All valuable papers saved.

PLACES OF ASSEMBLY

February 22, 1918. Red Wing, Minn. Red Wing Municipal Auditorium. Corner Third and East avenue. Auditorium. Three-story building. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started in orchestra pit. Discovered by smoke coming through roof about 2:30 a. m. Alarm, box and Gamewell system. Duration, 1 hour. Stopped at cupola on roof. Fire was retarded by asbestos curtain and firewalls. Private fire apparatus, hose and chemicals. Means of escape, ordinary exits. Value of building and contents, $80,000. Property loss, $30,000.

PRINTERS AND BOOKBINDERS

March 9, 1918. Attleboro, Mass. Attleboro *Sun* in Odd Fellows' Block, Bank street. Printing office. One 4-story and basement building partially destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in basement. Discovered by police department about 2:30 a. m. Alarm, street box. Duration, 2 hours. Stopped at top floor. Fire was retarded by construction. Firemen handicapped by having to fight fire in basement through floor above, there being no outside openings. Private fire apparatus, none. Injured, one fireman cut by glass. Means of escape, 2 stairways. Value of building and contents, $125,000. Property loss, $25,000.

RAILROAD PROPERTY

January 6, 1918. Cambridge, Mass. Boston & Maine R. R., off East street. Car repair shops. One 1-story building totally destroyed. Walls, wood, tinclad. Floors, planks. Roofs, tar and gravel. Cause, probably sparks from locomotive. Discovered by locomotive engineer about 11 p. m. Alarm, box. Duration, 9 hours. Fire was spread by explosion that blew building to pieces and scattered flames. Firemen handicapped by frozen hydrants; long hose lines; inaccessibility. Injured, 4. Value of building and contents, $267,562. Property loss, $93,051.

February 28, 1918. St. Albans, Vt. Central Vermont Railway, freight station. Allen street. Local freight houses. One 1-story building partly destroyed. Walls, wood. Floors, wood. Roofs, wooden shingles. Cause unknown. Discovered by skaters eighth of mile away about 9:30 p. m. Alarm, by electric alarm system. Duration, 35 minutes. Fire was favored by construction. Private fire apparatus, none. Value of building and contents, $6,000. Property loss, $3,200.

March 13, 1918. Glasgow, Ky. Glasgow Branch Railway. End of Upper Depot street. Freight depot. Two 2-story buildings partly destroyed. Walls, frame. Floors, wood. Roofs, metal. Cause, night watchman left blow pipe on in engine house. Fire started in engine house. Discovered by town marshal about 11 p. m. Alarm, firebell and Gamewell. Duration, 4 hours. Stopped at depot. Private fire apparatus, hose attached to plug. Means of escape, doors. Value of building and contents, $150,000. Property loss not reported.

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March 14, 1918. Lordsburg, N. M. Southern Pacific Company. Railroad yards. Twenty-five 1-story buildings destroyed. Walls, adobe and frame. Floors, wood and cement. Roofs, shingle and paper. Cause, broken standpipe where engines were filled. Fire started at supply tank. Discovered about 10:30 a. m. Duration, 24 hours. Stopped at oil tanks. No fire department. Private fire apparatus, none. Persons in building, 25 men in shops. Value of building and contents, $1,000,000. An engine, being supplied with oil, ignited the supply tank, which held about 35,000 gallons of fuel oil. The tank burned rapidly and, in about 10 minutes, collapsed, throwing burning oil all about the works, and into two large storage tanks, containing about 2,000,000 gallons of oil. At times the contents of the tanks would boil over the sides and the burning oil would run down through the lower sections of the Mexican part of the town. About 20 small houses owned by the Mexican laborers at the Southern Pacific shops were destroyed. Considerable damage was done to the tracks in the Southern Pacific yards, and to 5 locomotives, 4 box cars (3 loaded), bunk houses and machine shops. No organized fire department. No equipment to compete with a fire of this character. A force of men threw up levees of earth to hold the oil in one direction.

SCHOOLS AND COLLEGES

February 21, 1918. Delevan, N. Y. Delevan High School. School street. One 2-story building destroyed. Walls, brick. Floors, wood. Roof, shingle. Cause, over-heated boiler. Fire started in basement. Discovered by residents across road about 5:20 p. m. Alarm, telephone. Duration, 1 hour. Stopped in building of origin. Fire was retarded by brick walls. Firemen handicapped by lack of water. Private fire apparatus, none. Means of escape, fire escapes. Value of building and contents, $30,000. Property loss, $20,000.

February 24, 1918. Lavinia, Mont. Public School. One 2-story building, partly destroyed. Walls, brick. Floors, wood. Roofs, wood, rubberoid, and tar gravel. Cause, unknown. Fire started in basement. Discovered in night. Alarm, by ringing bell. Duration, 7 hours. Stopped in building of origin. Fire was retarded by construction. Firemen handicapped by extreme cold. Private fire apparatus, 2 chemicals. Value of building and contents, $22,000, approximately. Property loss not reported.

March 7, 1918. Grand Rapids, Michigan. Grandville High School. Suburban high school. One 2-story and basement building partly destroyed. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, unknown. Fire started in furnace room in basement. Discovered about 1:15 a. m. Alarm, telephone. Duration, 4 hours. Stopped at attic. Firemen handicapped by distance from city, 7 miles. Value of building and contents, $20,000. Property loss, $5,000.

March 14, 1918. Jacksonville, Ill. Jacksonville High School. Episcopal Church. 550 Church street, 360 West State street. Two buildings destroyed: School, 3-story building. Church, 1-story building. Walls, brick. Floors, wood. Roofs, church, wooden, shingles; school, slate. Cause, unknown. Fire started in basement of school. Discovered by passerby about 2:30 a. m. Alarm, telephone. Duration, 3 hours. Stopped at church. Fire was favored by wooden construction. Value of school building and contents, $125,000; church, $20,000. Property loss on school, $105,000; church, $15,000. Valuable papers and records were lost.

March 23, 1918. Hazleton, Penn. Church Street School. Church street, between First and Second streets. One 3-story building destroyed. Walls, stone and brick. Floors, wood. Roofs, slate. Fire started in basement. Discovered by passerby about 8:30 p. m. Alarm, box pulled. Duration, 18 hours. Stopped in building of origin. Fire was favored by wooden interior finish. Private fire apparatus, none. Means of escape, three inside stairs and fire escapes. Value of building and contents, $152,000. Property loss, $125,500.

THEATERS AND AMUSEMENT PLACES

March 5, 1918. Austin, Tex. Hancock Opera House. 120 West Sixth street. Theater. One 1-story and one 2-story building partly destroyed. Walls, stone and brick. Floors, wood. Roofs, tin. Cause, incendiary. Fire started in dressing room rear of stage. Discovered by employe about 10:30 p. m. Alarm, telephone. Duration, 1 hour. Stopped at roof of stage. Fire was retarded by asbestos curtain. Firemen handicapped by construction of stage, high building, steep roof, no access from interior. Private fire apparatus, inside hose and 3-gallon fire extinguishers. Persons in building, 30 or 40. Means of escape, exits on three sides. Value of building and contents, $100,000. Property loss, between $7,000 and $8,000.

TOBACCO WAREHOUSES AND FACTORIES

February 27, 1918. Rochester, N. Y. R. Whalen & Co. 5-9 Brown's Race. Tobacco manufacturers. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 3rd story. Discovered by employes about 8:42 a. m. Alarm, Gamewell system. Duration, about 3 hours. Stopped when building was destroyed. Persons in building, not stated. Means of escape, fire escape.

WAREHOUSES, PUBLIC STORES

February 8, 1918. San Antonio, Tex. G. A. Stowers Furniture Company. One block east of South Flores street. S. A. & A. P. railroad tracks. Furniture warehouse. Two 1-story buildings partly destroyed. Walls, iron clad. Floors, wood. Roofs, tin. Cause, unknown. Fire started in center of building. Discovered about 11:37 a. m. Alarm, box pulled. Duration, 1 hour. Fire was retarded by construction of buildings. Private fire apparatus, none. Value of building and contents, $3,000. Property loss, $9,792.

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February 9, 1918. Paris, Ill. H. H. Huston. Union street. Warehouse. One building partly destroyed. Walls, concrete block. Roofs, rubberoid. Cause unknown. Discovered by passerby about 11 p. m. Alarm, telephone. Duration, 5 hours. Stopped in building of origin. Private fire apparatus, Seagrave apparatus. Value of building and contents, $3,000. Property loss, total.

February 22, 1918. Des Moines, Iowa. Wheaton Transfer House. 315 E. Walnut street. Storage and transfer. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood, tar, and gravel. Cause, unknown. Fire started on second floor. Discovered by citizen about 2:40 a. m. Alarm, telephone. Duration, 3 hours. Stopped in building of origin. Fire was favored by wood construction, open stairways and elevator. Private fire apparatus, none. Means of escape, one fire escape. Value of building and contents, $59,189. Property loss $10,798. Records and valuable papers protected by iron safe.

February 27, 1918. Minneapolis, Minnesota. N. S. Nott Company. 743 Washington avenue, N. Warehouse. One 4-story building destroyed. Walls, brick. Floors, wood. Roof, gravel. Cause, overheated tar kettle, used to dry out basement. Fire started in basement. Discovered by police about 5:30 p. m. Alarm, telephone and street box. Duration, several days. Stopped at total loss. Fire was favored by wooden construction. Persons in building, 4. Means of escape, stairways. Value of building and contents, $114,000. Property loss, total.

March 11, 1918. Philadelphia, Pa. Pennsylvania Grain & Feed Company. 1331-1333 North Thirty-first street. Preparing grain and cattle feed. One 3-story building destroyed. Walls, stone and brick, wood lined. Floors, wood. Fire started on first floor. Discovered 4:12 p. m. Alarm, box. Duration, 7 hours. Stopped at roof. Firemen handicapped by walls being lined with saw dust, it formerly having been a cold storage house. Private fire apparatus, water connection. Killed, 1 fireman. Injured, 1 fireman. Means of escape, fire escapes. Value of building and contents not reported.

March 26, 1918. Jersey City, N. J. Jarvis Warehouse Company; Erie R. R. Shops. Provost and 12th streets. Warehouse. Three buildings, and several sheds destroyed. Jarvis Warehouse, 7 stories. Walls, brick. Floors, frame. Roofs, slag. Cause, cigarette. Fire started in corrugated iron building, where chlorate of potash was being weighed. Discovered by workmen about 3:12 p. m. Duration, several days. Stopped at Erie shops. Explosion practically destroyed building. Private fire apparatus standpipe system and sprinklers. Persons in building, 35. Injured, 12, not seriously. Means of escape, fire escapes. Value of building and contents, $1,500,000.

WOODWORKERS

February 3, 1918. Akron, O. Lyman-Hawkins Lumber Company. Corner High and Chestnut streets. Lumber mill. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, wood and rubberoid. Cause, unknown. Fire started in rear of building. About 1:09 p. m. Alarm, telephone. Duration, five hours. Fire was favored by construction. Firemen handicapped by intense heat. Private fire apparatus, none. Persons in building, 1. Injured, 1. Value of building and contents, $39,500. Property loss, $33,000.

February 16, 1918. Rimouski, Que. Industrial Manufacturing Company. Avenue de l'Eviche. Manufacturing window frames, doors and sawing lumber. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, wood and paper. Cause, ignition of torch used in thawing water pipe on boiler. Fire started in boiler room. Discovered by watchman. Alarm, telephone. Duration, 3 hours. Stopped in same building. Fire was favored in its spread by hollow wood walls. Private fire apparatus, 1 hydrant and 250 feet 2½-inch hose. Persons in building, 1 watchman. Means of escape, ordinary doors. Value of building and contents, $12,000. Property loss, $10,300.

February 26, 1918. Charlestown, Mass. Boston Wagon Company. 23-25 Front street. Carriagesmith, stable and wagon shed. One 2-story building partly destroyed (stable). Four-story brick flour mill, 150 yards distant, ignited, but blaze extinguished with small loss. Six-story hotel building, Waverly House, adjoining, caught fire from sparks, with slight loss. Walls, stable, frame, with brick ends. Floors, wood. Roofs, shingle. Cause, believed to be of suspicious origin. Fire started in blacksmith shop and stable. Discovered by employe. About 2 p. m. Alarm, fire alarm system. Duration, 1½ hours. Stopped at brick wall at east end. Fire was favored by frame construction and wooden shingles. Firemen handicapped by high winds. Private fire apparatus, none. Persons in building, 7. Injured, 2 firemen. Means of escape, stairs and doors. Value of building and contents, approximately $20,000. Property loss, $15,300.

March 19, 1918. Edinburg, Ind. Tessellated Flooring Company. Campbell street and Pennsylvania R. R. Storage house. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started lower floor. Discovered by neighbor. About 2.40 a. m. Alarm, telephone. Duration, 36 hours. Stopped in main building. Value of building, $15,000; contents, $70,000. Property loss, total.

KILLED AND INJURED IN FIRES

January 6, 1918. Cambridge, Mass. Boston & Maine R. R. Car repair shop. Four persons injured.

February 3, 1918. Akron, O. Lyman-Hawkins Lumber Company. Lumber mill. One person injured.

February 19, 1918. Kansas City, Mo. Brady building. One fireman killed, 2 firemen injured.

February 10, 1918. Port Arthur, Tex. Jefferson Hotel. Three persons slightly injured.

February 21, 1918. Worcester, Mass. W. H. Sawyer Lumber Company. Lumber yard. One person killed, 20 firemen injured.

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February 22, 1918. Peabody, Mass. Dwelling and barn owned by M. Miller. Nine persons burned to death.

February 22, 1918. Dallas, Tex. Film exchange. Three persons singed.

February 24, 1918. Edmonton, Alta. New Maryland Hotel Garage and poolroom in basement. Two firemen injured.

February 26, 1918. Charlestown, Mass. Stable. Two firemen injured.

February 26, 1918. Terre Haute, Ind. Dwelling owned by F. Uncell. Two persons lost life.

March 9, 1918. Attleboro, Mass. Premises Attleboro *Sun*. One fireman cut by glass.

March 11, 1918. Philadelphia, Pa. Pennsylvania Grain & Feed Company. Grain warehouse. One fireman killed; 1 injured.

March 12, 1918. Charlestown, Ill. Scherer Block. Three injured by smoke and heat.

March 17, 1918. Philadelphia, Pa. J. Wellner, dealer in musical instruments. Two firemen injured.

March 17, 1918. Johnstown, Pa. Six business buildings. About 12 persons injured.

March 18, 1918. Lowell, Mass. George L. Cady & Sons, box manufacturers. One killed, three injured.

March 26, 1918. Jersey City, N. J. Jarvis Warehouse Company. Erie Railroad. Warehouse. Twelve persons slightly injured.

April 5, 1918. Kansas City, Mo. American Steel & Wire Company and others. Eight persons injured.

April 13, 1918. Norman, Okla. State Hospital for Insane. Sanitarium. Thirty-nine killed.

Health and Sanitation in Shipyards

THE Department of Health & Sanitation established by the United States Shipping Board & Emergency Fleet Corporation has undertaken the problem of improving sanitary conditions in old shipyards and the establishment of standard conditions in those under construction.

The health of the employe is given every consideration. His efficiency at this emergency period depends upon health. His spirit must also be strong and to insure this it is necessary that his physical surroundings be productive of contentment. Injuries must receive prompt and efficient treatment. The department encourages the employment of medical men of the highest attainment and the facilities for doing their work properly must be provided.

Living quarters for employes must be maintained in sanitary manner, eliminating contagious disease and sickness. Food when served must contain sufficient nourishment to sustain the laborer in his efforts to support the government in this emergency period. Not only must his quarters be kept clean but grounds about barracks and living quarters must be properly drained and kept attractive.

Many of our shipyards are located in districts in which the mosquito abides. Active steps are now being taken by the department to drain the adjoining territory and it is obtaining the co-operation of neighboring city and State health boards in mosquito extermination.

Shipyard owners are asking assistance in problems confronting them.

The Department of Health & Sanitation is able to supply them with hospital plans, with estimates of construction and equipment. Its plans are available for dispensaries or other hospital facilities and it is prepared to give them expert advice on any matter pertaining to health, hospitals, dispensaries, medical attendance, nurses, etc. Also can it give them expert advice regarding all types of sanitary work, on sewage disposal, water supply, drainage and work of this type.

At the home office, the Department of Health & Sanitation has equipped a small dispensary which is being taken advantage of by many employes of the board and corporation who come for advice regarding sickness or minor injuries.

This department also has established a local welfare department and will employ the services of a middle aged woman of experience, who will act as "mother" to the many girls employed. She will serve in this same capacity for the boys. Her duties will be to see that all cases of sickness be looked after and that suitable quarters and housing arrangements are made for employes who seek her services. She will be available for advice and comfort and be prepared to visit the sick girl or boy whose mother may reside in another city. She will be the connecting link between the employe and the doctor.

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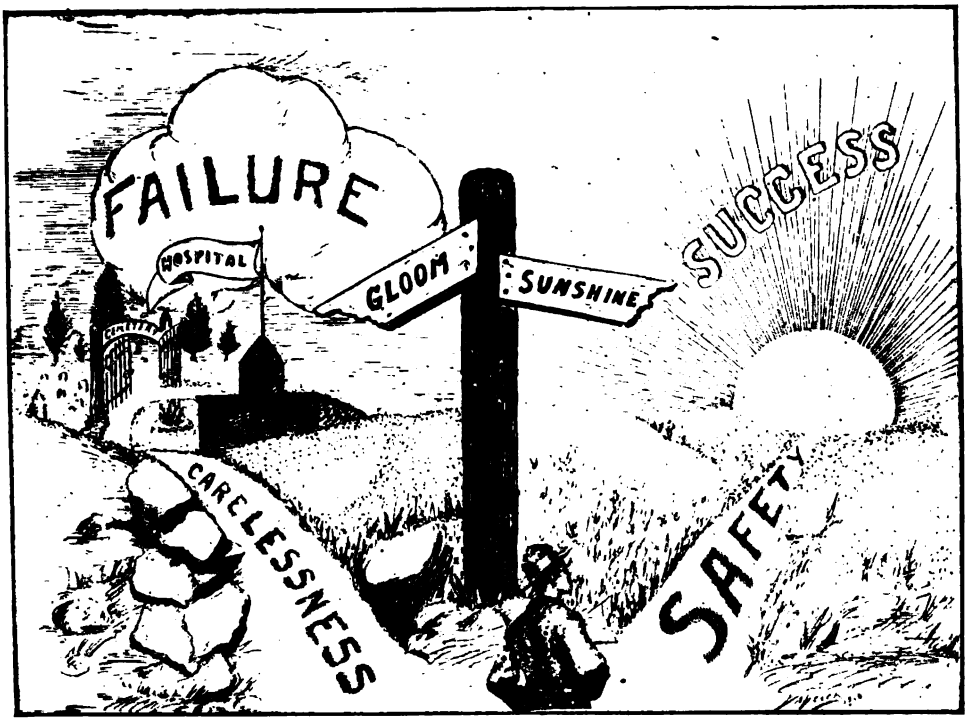

Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

CHOICE OF ROADS

Safety Sign of Steel and Wood

AT the reduction plant of a leading copper mining company in Montana there has recently been set up in a conspicuous position a sign of steel and wood construction, 16 feet wide and 11 feet high. The front of the sign is divided up into 8 panels, each capable of holding from 30 to 35 six-inch steel enameled letters. These letters are white on a green background, white on green being the entire color scheme of the sign, excepting the copper-colored rim of the clock and the ingot inserted in the dial. The letters are interchangeable. This factor makes the sign flexible to a very great extent, since it permits frequent changes in the reading matter. Some of the wording is changed every day, so that the message is always fresh, interesting and timely. A practice is made to show in the upper two panels the number of accidents that occur in the plant in the preceding 25 hours, and the departments where the accidents took place. The other panels are used for safety slogans or rules. At night the sign is illuminated by a flood-light projector.

For Universal Safety

IN every plant, small or large, say those who know, a man should be appointed who knows safety methods, and who should be given time and authority to go about the plant and instruct the men. There should be a bulletin board in each department, showing pictures of injured men, with a story of the injury and what might have been done to prevent it.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

TOOL CONSTRUCTION AND STANDARDIZED PRODUCTION

H. A. Zeckendorf of the U. S. Safety Tool Co., 703 Market street, San Francisco, Cal., is the patentee of the Patent Safety Tool Locking Device, which should be of interest to industrial safety men on account of its claims of safety, economy and efficiency in the use of certain tools.

The accidental flying off of an axe head from its handle brought the inadequacy of the current method of adjustment of tools to the inventor's attention.

Since primitive man first appeared on earth the theory and method of tool fastening has never materially deviated from his crude notion of driving a wooden or metal wedge into the end of the handle and presuming that this mode, depending on friction tightness alone, was sufficient.

While admitting the simplicity of this adjustment, yet it has been responsible not only for a heavy toll in accidental deaths and injuries to the workers, but it also excluded the possibility of a standardized production.

In presenting the tools of the U. S. Safety Tool Co. to the American consumer for the first time in the history of the tool industry, a product has been created which meets the modern and exacting requirements of Safety, Economy and Efficiency.

SAFETY

The importance of this invention of a safety device will be apparent when the following figures in the Report of the Industrial Accident Commission of the State of California for the year 1914 are taken into consideration.

Total number of accidents..... 62,241
Due to defective tools and their handling 5,731

Classified as follows:	No. of Accidents	Per cent of Total
Misuse of tools	4,667	81.4
Carelessness of fellow-workers	301	5.2
Defective adjustment between tool and handle.	576	10.0
Tools flying off.....	108	2.0
Defective handles	79	1.4
Total	5,731	100.0

It will thus be noted that 13.4 per cent of all accidents classified are directly traceable to the faulty system of adjustment of tools as now current. Nor is this percentage unusual as compared with the experience of the great industrial enterprises. For instance, Bulletin No. 5 of December, 1914, issued by the U. S. Steel Corporation, Bureau of Safety, Sanitation and Welfare, presents the following facts as of record for the year 1913:

Total number of accidents.....	70,702
Total percentage of accidents classified under hand labor.....	43.88%
Total percentage of accidents classified under hand labor due to sledge hammers, hatches or hand tools	16.43%
Amount expended for accident relief	$3,013,638.12
Accident prevention	660,593.84
Total	$3,674,231.96

It would thus establish that the 16.43 per cent casualty list to hand labor arising from the use of hand tools represents about 7 per cent of the total number of accidents. This shows the heavy financial loss of $211,000 in the form of indemnities, and the appalling amount of needless suffering brought about by the lack of a better system, which this invention seeks to remedy.

ECONOMY

The Patent Tool Locking Device, constructed in strict accordance with correct mechanical principles of a male and female wedge, just as a bolt and nut are used in assembling objects in rigid emplacement, is simple in construction and leaves all working parts unimpaired in their natural strength, actually reinforcing them. The handles will not only last longer, but the time and effort required to remove and replace them is so much reduced that all large industrial plants undoubtedly will proceed to adopt this system as speedily as the value of this invention is brought to their attention and output can be delivered.

Careful inquiry seems to assure lower insurance rate from casualty companies where these tools are adopted in shop practice.

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EFFICIENCY

Engineers who have tested the tools fitted with the Patent Locking Device have agreed that it sustains every claim made for it and that it enables the workman to produce more because the fear of accident is removed. Working at all times with tools securely locked to the handle, it stands to reason that the laborer will manipulate the tool with a confidence that he would never have with the fear of an unsafe tool.

DEFECT IN THE CURRENT METHOD OF ASSEMBLING TOOLS

At the present time edge tools of all types—except railroad and surface picks—are fastened to the handle by spreading the end or top portion by means of metal or wooden wedges, which are held in position by friction tightness alone, with the result sooner or later of loosening or falling out, not to mention the unscientific application of mechanical principles, to wit—weakening the handle along the line of greatest strain by slotting, splitting its grain and making a perfect adjustment or contact between surfaces impossible.

At the present time every manufacturer uses his own standard of tool eye, hence the existing difficulty in replacing broken parts, entailing loss of time and employment of skilled labor to overcome this lack of system. Moreover, if breakage of handle occurs it is a matter of considerable annoyance to remove the broken part from the tool, compelling either a process of drilling or burning out, with consequent injury to the tool, not to mention the loss of time and temper it entails.

SUPERIORITY OF THE PATENT SAFETY TOOL

In this invention the vital parts of the tool and handle are left intact. The locking between them occurs in a place where there is the least strain or wear. The wedge principle is applied in such a way that the attachment between tool and handle increases in the same measure as the parts tend to separate.

With the establishment of a standard eye in every tool, as made possible by this invention, the aforementioned objections are completely overcome. The natural taper in the tool eye, instead of the double taper as now used, gives us the key to the solution of the problem, and it is astonishing that so simple a mechanical principle should not have been thought of and in use long ere this.

FOAMITE FOR EXTINGUISHING OIL FIRES

The Foamite Fire-Extinguisher Company, 200 Fifth Avenue, New York, manufactures and installs Foamite protection which is especially effective in extinguishing oil fires. Already over 6,000 large oil storage tanks and leading oil producers and refiners throughout the country have been equipped with Foamite protection.

This company has recently placed on the market Foamite three-gallon hand extinguisher fire pails, and forty-gallon two-wheeled chemical engines. In order to take care of its growing business, this company has recently opened an office in the Orear-Leslie Bldg., Kansas City, Mo., where Mr. E. W. Ross will be in charge.

SAFETY DEVICES FOR RAILROAD TRACKS

The Acar Mfg. Co., 30 Church St., New York, manufacture a signal safety device which is attached to the rail where persons may be working around cars that may be moved at any time. The sign is locked to the rail and fits 56 to 100-pound rail sections, and is used for repair, depot, team, loading, unloading, construction, coal and coke and factory tracks.

Other particulars of this railroad safety sign can be obtained from the manufacturer mentioned above.

CLEAN COAL WILL SPEED VICTORY

To stimulate production and to improve the quality of coal, the Fuel Administration allows 20 cents per ton to be added to the Government price for coal at the mine, where mechanical appliances and additional labor are employed to separate slate or carbon from the coal.

In order that every miner may understand the Government's desire for clean coal, operators are displaying signs printed in five or more languages, as follows:

"CLEAN COAL—A MINER LOADING DIRTY COAL IS DISLOYAL. DO YOUR DUTY AND LOAD CLEAN COAL."

The Safety First Supply Co., Hartje Office Bldg., Pittsburgh, Pa., are distributors of a baked enamel sign printed in five languages which is guaranteed to be unaffected by weather or fumes, and it is claimed it will remain clean and effective for several years.

PROTECTION AGAINST DUST

In many industrial establishments the atmosphere becomes charged with dust. Such an atmosphere is not fit to be breathed into the lungs, and in order to safeguard those working in such an atmosphere against disease and to protect their health, it is necessary that the air be purified before being breathed. A respirator is a universal remedy for this purpose.

Walter Soderling, Inc., 347 West Broadway, New York City, after painstaking experiment, has recently placed on the market a respirator known at "Dustite." This

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respirator has passed the test of the Underwriters' Laboratories.

Further particulars will gladly be furnished by the above mentioned manufacturer.

SANITARY DRINKING WATER FACILITIES

The attention of industrial employers, safety officials and health conservationists is being more and more directed to the importance of furnishing sanitary methods for supplying drinking water to their employes.

When it is realized that every person during the working day requires one to several drinks of water, it is apparent that only drinking facilities which are safe against infection should be permitted, and each time a person drinks water, the receptable which comes in contact with their mouth should be safe and clean.

With the abandonment of the common drinking cup an important advance was made in conserving the health of industrial workers against contracting disease. The introduction of sanitary drinking fountains which conform to the requirements of sanitation and hygiene provide a safe and practical means of furnishing drinking water to large numbers of people. Not only should the bubbler be of a type which cannot be contaminated, but the water should be furnished at the proper drinking temperature, namely, about 50 degrees F. This is also a feature of the latest types of bubbling drinking fountains.

No employer will regret giving careful attention now to drinking water facilities and he will find that the installation of this modern method of furnishing drinking water has many advantages which will prove profitable to him and to his employes. Sanitary drinking fountains constitute an excellent investment.

FIRE RESISTIVE CONSTRUCTION

In these days when so many manufacturers are adding to their establishments and constructing houses for workmen, fire danger should be given careful consideration. To erect buildings of combustible material near large factories, especially those making ammunitions and explosives, adds distinctively to the fire hazard of the community.

The Keasbey & Mattison Company, Ambler, Pa., manufacturers asbestos building material which is well adapted for the construction of industrial and residential buildings and which is proof against fire destruction. This material is now being extensively used for hangars, and especially for roofing all classes of buildings, removing one of the worst fire perils, namely, the combustible wooden roof.

The above mentioned company will be pleased to furnish any further information desired.

UNDERWRITERS' LABORATORIES

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

CHEMICAL EXTINGUISHER, 2½ Gals. Foam Type. Erwin Mfg. Co., Submittor, 310 Montgomery Bldg., Milwaukee, Wis.

ENCLOSED SWITCHES. Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

FIREPROOFING PROCESS FOR GIN BALED COTTON. Cotton Protecting Co., The, Submittor, Oklahoma City, Okla.

HOLLOW METAL FIRE WINDOW FRAMES. Biegler Co., Louis, Mfr., 165-171 N. Curtis St., Chicago, Ill.

LADDER FEET. Chesebro, Whitman Co., Inc., Mfr., 64th St. and 1st Ave., New York, N. Y.

LIGHTNING RODS. Foy Co., The E. A., Mfr., 815 Broadway, Cincinnati, Ohio.

MACHINE PARTS. Safety Set Screw. Allen Mfg. Co., The, Mfr., 135 Sheldon St., Hartford, Conn.

MINIATURE MOTION PICTURE MACHINES. DeVry Corp., The, Mfr., 117 N. Wells St., Chicago, Ill.

OPTICAL INSTRUMENTS. Hardy & Co., F. A., Mfr., 10 S. Wabash Ave., Chicago, Ill.

SHEET METAL FIRE WINDOW MULLIONS. Biegler Co., Louis, Mfr., 165-171 N. Curtis St., Chicago, Ill.

SHEET METAL FIRE WINDOW MULLIONS. Herrmann & Grace Co., Mfr., 671-689 Bergen St., Brooklyn, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOORS. Birmingham, W. J., Mfr., 1119-1123 Superior Ave., N. E., Cleveland, O.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Jamar-Walker Co., Mfr., 414-416 East Superior St., Duluth, Minn.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. York Corrugating Co., Mfr., York, Pa.

SOLID SECTION METAL WINDOW FRAME. Detroit Steel Products Co., Mfr., Detroit, Mich.

SWINGING, SHEET METAL SHUTTER. Merchant & Evans Co., Mfr., 2019 Washington Ave., Philadelphia, Pa.

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SAFETY ENGINEERING

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National Fire Protection Association, 1918 Meeting

By Charles E. Worthington

THE fire insurance interests felt that they could assist in keeping the American factories fit for fighting, through acting upon the modern theory that an ounce of prevention is worth a pound of cure. A very common factory disease is that of fire. It is all too prevalent in every year, but under wartime conditions it began to resemble an epidemic. The National Board of Fire Underwriters felt that the industrial fire loss menace had become acute; it undertook to see what could be done toward keeping America's supply plants in the industrial trenches. In co-operation with the Council of National Defense, with other fire insurance organizations, and with many local and State officials, it organized and directed a nation-wide campaign, employing the services of some 3,500 inspectors and surveyors, operating under various State executive committees. In some States these inspectors were given official standing by commissions from the Government. Within a few months there were literally tens of thousands of American factories, grain elevators, flour mills, warehouses, cotton compresses, saw mills, fertiliser works, piers and similar premises individually inspected by men who had received special training in the detection and correction of fire hazards. These men received their salaries from the fire insurance companies, but they were definitely instructed, while engaged in this task, to "forget that they were insurance men," and remember only that they were performing a public service in conserving the national resources.—From the address of W. E. Mallalieu, General Manager, National Board of Fire Underwriters, before the National Fire Protection Association.

FIGURATIVELY speaking, there was a period when the 1918 meeting was "up in the air," because of doubts expressed as to the advisability of continuing the annual meetings during the war. Wiser counsels prevailed, however, and the meeting was called; wiser, because continuity and interest are very near akin, and the omission of a single meeting in its due order would exercise in all probability an adverse influence likely to grow and possibly lead to further omissions—such, at least, has been the history of other bodies where final decadence is traceable to irregular convocation—and wiser, also, because of the need of getting close together in strenuous times, of personal contact, which is always a stimulus to work.

The First Day's Proceedings, May 7

Literally, the meeting was "up in the air," in the spacious auditorium of the Chicago Insurance Exchange, on the 21st floor of the noble building devoted to the uses of the insurance fraternity—high enough to be above and beyond the view of the streets and the noise of the elevated railway that runs beside it; lofty

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enough if locality influences thoughts to develop the highest motives.

The meeting was scheduled for 10 o'clock, but evidently the bracing air of Chicago had not as yet taken full effect on the members for they came later.

At the conclusion of the roll-call, Secretary Franklin H. Wentworth presented the report of the secretary-treasurer and editor of the *Quarterly*.

REPORT OF SECRETARY AND EDITOR

In the fiscal year just closed the association has not escaped the storms and stress which have been the common lot of its sister associations. Many of our members within the age of military service have gone into the army and navy; many have changed their occupations in civil life. But, as strenuous efforts at the beginning of the war overcame the losses in our Canadian membership, so our efforts for new memberships during this year have not only maintained, but increased our total list. In spite of our losses our associate membership shows a gain for the year of 92, and we have at last passed the three thousand mark, our books showing on April 30 a total associate membership of 3,014. Two organization memberships were lost by the consolidation of three inspection bureaus, one member now representing the three, making our present number of organization members 130. Our members have seemed to realize their special responsibility during this time of the nation's need, our heavy office correspondence testifying to this, revealing many cases of quiet, watchful service to fire prevention unknown to the public or to officials.

It is now over a year since the publication of our monthly *News Letter* was begun. It has established itself as an indispensable feature of our service, prized both by our members and by our press exchanges. The twelve issues of the year aggregated 42,000 copies. The edition of the *Proceedings* of the last meeting of the association, a book of 428 pages, was 3,800, and 3,800 copies of our year book and membership directory were printed. Differences of opinion seem to exist as to the most convenient method of listing the members in the directory. Some members would prefer a straight alphabetical arrangement after the old method; others think our present plan of locating members in their respective cities is especially desirable. To list the addresses both ways would make the cost of the year book prohibitive, as under the present plan its printing and mailing costs over $500 per year. Perhaps the members present at this meeting may desire to discuss this matter of the directory.

Field Practice, the association's inspection manual, has continued in demand. We have a fair quantity of these books yet on hand. The educational publications of the year will be reported by the Committee on Public Information.

The *Quarterly* has now completed its eleventh year. The edition has been again increased, the total number of copies printed being 14,600, twelve hundred more than last year. The following fifteen members contributed special articles during the year: Messrs. A. T. Bell, George W. Booth, W. J. Canada, M. L. Carr, Walter A. Hull, Edward H. Keith, Robert D. Kohn, R. B. Matthews, H. L. Miner, John J. McCarthy, R. L. Rowley, R. E. Swearingen, Hermann von Schrenk, C. F. Wagner, Charles E. Worthington. Tabulated fire records were carefully worked out and published during the year on two classes of properties, groceries and motion picture houses, and an especial analysis made of sprinkler fires in which a large loss was sustained. The annual summary of statistics in properties having automatic sprinkler protection was published as usual in the closing number of the current volume.

It should be a matter of peculiar pride to the association that three of its oldest members have been chosen by the Government to direct the fire prevention section of the War Industries Board. This recognition of the abilities of Mr. Merrill, Mr. Mallalieu and Mr. Pierce proves the value of a background of experience at a time of common need. Many other less prominent positions of responsibility in Government fire prevention work are being held by members of the association, and other positions remain yet to be filled. The war has created such a demand for a knowledge of fire protection that our mail is laden with requests for help, not only from official, but from civil sources, because in the years past practically every man in the country having an interest in fire protection has come into our membership. It is not the least of our satisfactions to realize that our meetings, our discussions and our literature have been steadily these many years equipping our members for their present service. It is the past of experience that makes the future of power.

We all want our lives to count for something, and if during the years of peace we shall have by patient labor fitted ourselves for a special service other men cannot render in this day of war, no matter how humble our station in the general scheme may be, we shall not have worked in vain.

President Wiederhold delivered the usual address, which was listened to attentively and applauded heartily.

PRESIDENT'S ADDRESS

PRESIDENT LOUIS WIEDERHOLD, JR., OF PHILADELPHIA: Twenty-two years ago a mere handful of fire protection engineers organized the National Fire Protection Association and boldly stated their objects—to promote the science and improve the methods of fire protection and prevention, and to

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obtain and circulate information on these subjects, and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by fire. Improvement in the methods of fire protection and prevention has shown marked progress, and the co-operation of our members has been all that could be desired, but the one real problem remains unsolved: How can we make the people of this country understand their responsibility for the pernicious results which must inevitably follow unbridled prodigality? We have never quite understood what it means to save or be careful, and even with our country at war we cannot bring ourselves to believe that our resources are without end. We have been reared in the lap of plenty, and go blissfully on, wasting and wasting, ever cheerful in the thought that somehow all that has been willfully or carelessly destroyed will be replaced. As nature abhors a vacuum, so she detests waste, and neither wisdom nor science has ever successfully ignored her immutable requirements.

Facing such indisputable fundamentals, we know that ignorance must fail, and, though unstated in so many words, the most important object of the National Fire Protection Association is to dissipate such ignorance and bring the public to understand that fire waste and attending sacrifice of human life can and must be checked. Laws and ordinances have had some effect, but as a rule the people fail to take such regulations seriously, because they do not understand the necessity for enforcement. They must be educated, and this means that by every method available, both public and private, the gospel of fire protection and prevention must be preached incessantly. Unfortunately, the National Fire Protection Association has always been handicapped for lack of sufficient funds. We should have many thousands of dollars per annum for publicity work instead of a few hundred, and the constant aim of the executives should be to develop our financial resources. Your secretary and treasurer is deserving of the highest praise for the value he has obtained for every dollar expended. I have never known an organization to do so much with so little money.

The National Fire Protection Association has accomplished a great deal, but we are engaged in a hard, uphill fight, and it may be years before the fire waste figures reflect our success; but, working shoulder to shoulder with the Bureau of Standards, National Board of Fire Underwriters and other members active in the campaign, we must succeed, and I hope to live to see the day when we may favorably compare the fire loss figures of our American cities with those abroad.

In the present critical period, when the protection of our factories and stores at home may have such an important bearing upon the outcome of the war, it should be a great satisfaction to our members to reflect that practically all the standards in use are the result of their labors in our struggle for sound economic conditions.

In conclusion, permit me to express my gratitude for the support you have accorded my administration, and assure you that I shall always consider it an honored privilege to lend my assistance in furthering the aims of the National Fire Protection Association.

As soon as reasonable quiet was restored, Secretary Wentworth came forward and in behalf of the association he presented to President Wiederhold a handsome pearl stickpin as a memento of service, which was accepted in some brief but Wiederholdian remarks that apparently were exceptionally pleasing to the auditors.

The following resolutions were unanimously adopted:

RESOLUTIONS MAY 7, 1918

The National Fire Protection Association, assembled in Chicago for its twenty-second annual meeting, again calls attention to the unusual hazards to life and property created throughout America by the world war. These hazards demand the utmost vigilance and initiative, not only from those in authority, but from the private citizen as well. Every individual should consider himself a fire warden of the Nation at this critical time, and

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should equip himself to serve his country by safeguarding to the extent of his intelligence and ability every form of natural and created resource. The elimination of waste, at all times the duty of good citizenship, is at this moment our profoundest public and private responsibility.

In its warfare against the needless sacrifice of human lives and property by fire the association advocates the following measures:

(1) The adoption by municipalities of the Standard Building Code of the National Board of Fire Underwriters, to the end that fire-resistive building construction may be encouraged, the use of inflammable roof coverings prohibited, adequate exit facilities from buildings assured, and interiors so designed and fire-stopped as to make easy the extinguishment of fires therein.

(2) The adoption by all States of minimum building requirements for the protection of State and county hospitals, schools, asylums and similar institutions outside city limits and of small communities in which the establishment and enforcement of a building code is impracticable.

(3) The enactment by each State of the fire marshal law advocated by the Fire Marshals' Association of North America, to the end that official investigation may be made of the causes of all fires, preventable fires may be eliminated by public education, and the crime of arson stamped out.

(4) The adoption of the association's suggested ordinance providing for the systematic inspection of all buildings by city fire marshals or local firemen to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices.

(5) The enactment of ordinances similar to that of Cleveland, Ohio, fixing the cost of extinguishing preventable fires upon citizens disregarding fire prevention orders, and a more general legal recognition of the common law principle of personal liability for damage resulting from fires due to carelessness or neglect.

(6) The wider general use of the automatic sprinkler as a fire extinguishing agent and life saver and the more general adoption of the fire division wall as an important life saving exit facility.

(7) A careful study of the technical surveys of cities made by the engineers of the Committee on Fire Prevention of the National Board of Fire Underwriters covering the items of water supplies, their adequacy and reliability, fire department efficiency, fire alarm systems and conflagration hazards, and of the possibility of co-operation among neighboring cities through mutual aid and the standardization of hose couplings.

(8) The adoption of the association's suggested laws and ordinances for State and municipal regulation of the transportation, storage and use of inflammable liquids and explosives.

(9) The universal adoption and use of the safety match and legislation prohibiting smoking in all parts of factories, industrial and mercantile buildings except in such fireproof rooms as may be especially approved for the purpose by the fire departments.

(10) The education of children and the public generally in careful habits regarding the use of fire.

(11) The co-ordination of all these activities, through a central administrative officer or body of the State or city having primary jurisdiction, for the purpose of promoting uniformity of action and efficient co-operation.

In the furtherance of these objects the association appeals for the co-operation of all citizens. It asks them to help in the dissemination of its valuable literature and in the use of the standards of fire protection so carefully worked out by its committees to the end that the lives and substance of our people shall not continue to be dissipated by a reckless and easily preventable waste.

MEMBERSHIP, PUBLIC INFORMATION

The Committee on Membership reported salient facts already given in the secretary's address, and urged that especial effort be made to increase the membership during the coming year to meet the demand for broader work.

Then followed the report of the Committee on Public Information, always interesting. The chief effort during the year past has been a campaign for the adoption of ordinances modeled after the ordinances of Cleveland, Ohio, fixing personal liability for the cost of extinguishing fires due to neglect and carelessness. In this matter progress is reported, although no very definite results have been obtained to date. Bills have, however, been introduced in several State legislatures and with good prospects of passage. Action is also expected by Canadian legislatures. A movement has also been started looking to the formation of local fire prevention committees. The holiday bulletins have been published as usual, and in addition several "war bulletins" referring to conservation, chimneys and freezing of fire appliances. The numerous educational bulletins of the National Board of Fire Underwriters are discussed fully, especially noting the proposed issue of a book on domestic hazards by the National Bureau of Standards. The report closed with an appeal for energetic work by the members. So interesting

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and instructive was the entire document that it is to be regretted that limits of space prevent its verbatim reproduction.

MERRILL'S ADDRESS

At this point President W. H. Merrill of the Underwriters' Laboratories delivered a brief address. His address was scheduled to come later, but because of a summons to Washington on official business it was necessarily advanced. Mr. Merrill told of the plans of the Government in regard to fire prevention through the work of the Fire Prevention Section of the War Industries Board, of which he is chairman. Three weeks of investigation have developed the existence of serious fire hazards in a dozen aeroplane factories and a hundred munitions factories, and the work of investigation is only begun. The rectification of these conditions is the object of the commission.

Mr. Merrill said that the Fire Prevention Section is located temporarily in the Quartermaster General's building, 18th street and Virginia avenue, Washington. The organization is as follows:

Executive Committee: W. H. Merrill, chairman; Frank L. Pierce, W. E. Mallalieu, George W. Booth and Charles H. Smith. Mr. Booth and Mr. Smith are secretaries and associate chiefs of the section.

Co-operating Committee (temporary appointments): Treasury Department, Hendon Chubb; War Department, Military Intelligence Branch, Colonel R. H. Van Deman and G. H. Dorr, assistant to the Assistant Secretary of War; Army Ordnance Department, Lieut. Colonel W. H. Eaton; Navy Department, Office of Naval Intelligence, Captain Roger Welles and Mr. Todd; Department of Justice, Alfred Bettman; Shipping Board, Charles Page; Food Administration, Edgar Rickard; Labor Department, Housing Division, B. L. Fenner.

Advisory Committee: R. M. Bissell, of Hartford; F. C. Buswell, Henry Evans and C. G. Smith, of New York; John R. Freeman, of Providence; John Marshall, Jr., of Chicago; C. A. McCotter, of Indianapolis; S. Y. Tupper, of Atlanta; L. R. Welch, of Pittsburgh.

Continuing, Mr. Merrill remarked: "We propose to utilize in our work the local and district fire inspection services at present operating in the United States for the purpose of obtaining data on the conditions existing in respect to fire hazard in plants manufacturing munitions. Where reports obtained from these sources indicate that adequate protection against fire loss is not provided for such plants we propose advising the Government departments contracting for supplies from these sources of the conditions existing and the proper remedies therefor, that corrective measures may be obtained by them through clauses in contracts requiring adequate fire protection in plants working on Government orders or by such other means as may be available.

"Where circumstances warrant we propose enlisting the aid of the fire marshals in the various States of municipal fire prevention bureaus, of insurance boards, bureaus, associations and companies in co-operative effort for the prevention of fire loss. We propose to communicate with owners and occupants of plants making munitions, asking their co-operation in all measures tending to prevent loss by fire.

"We propose that for the purpose of making surveys inspections and special investigations only such inspectors and engineers shall be eligible for use by the Fire Prevention Section as may have been qualified and licensed by the said section; such licenses only to be issued to men concerning whom satisfactory information as to loyalty and ability has been ascertained by means of the questionnaires collected by the Treasury Department and such other investigations as the section may devise and deem necessary. We propose to prevent so far as possible all duplication of effort in inspection services on the part of either Governmental or insurance agencies.

"We propose to ask from the several governmental departments, such as the Army Intelligence Bureau, the Navy Intelligence Bureau, etc., copies of records which they have thus far collected with respect to the physical conditions of munition plants and a list of all such properties that all work of the character as-

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signed to the Fire Prevention Section may be co-ordinated and be available to the War Industries Board and to any department authorized to make contracts on behalf of the Government.

"We desire to be promptly informed of all important contracts for munitions that may be awarded, that inspections of plants and recommendations for fire protection therein may be made through this section.

"We respectfully request the cordial co-operation of all departments and bureaus of the Government which in the course of their work may secure data on fire hazards covering plants making munitions through prompt advices to the section that effort may at once be made to remove hazardous conditions.

"The section may be consulted on all questions of fire prevention and fire protection at any time and will have experts available."

Mr. Merrill explained that the word "munitions" is to be broadly defined as including all materials, machinery and supplies used for war purposes. "Munitions plants" include all private properties where munitions are manufactured, handled or stored.

FIRE AND ACCIDENT PREVENTION

The Committee on Fire and Accident Prevention Day presented a report in detail of what had been done during the year past to secure public observance, indicative of considerable progress and anticipative of greater progress to come.

After receipt of this report a growing desire for more material than mental sustenance induced adjournment for lunch, first accepting the report of the Electrical Committee and the resignation of its chairman, F. E. Cabot, of Boston. Mr. Cabot, who was one of the original founders of the association, was elected honorary member, being the fourth of the original members to receive this recognition.

STATE FIRE PREVENTION ASSOCIATIONS

The afternoon session convened promptly at 2 o'clock (the Chicago air taking effect). The deferred report of the Committee on State Fire Prevention Associations was received, provoking rather desultory discussion, followed by the report of the Canadian Committee, and some brief reports of work done by local chapters.

In the Canadian Committee report reference is made to the Commission of Conservation, which has given "a great deal of attention to fire waste and is about to issue a special publication in regard to it." Reference is also made to Fire Marshal Heaton, of Ontario, who has "made a number of valuable suggestions regarding the lines along which fire prevention work might be extended in Ontario, which, among others, include a publicity campaign; the employment of traveling inspectors to not only discover and correct bad conditions of buildings and their occupation and care, but also to enlist the interest and support of the municipalities in passing of proper fire preventive by-laws, seeing that they are enforced, and maintaining and supporting an efficient fire brigade; such traveling inspectors to be also used to address the schools and enlist the interest of the children; also the prohibition of the use of matches except those which strike only upon the box." Improved fire ranging service under the Department of Forests and Mines of Ontario is also recognized, and it is stated that it is known that other provinces are interested in the investigation now being held in Ontario, and will be largely guided by its findings.

MALLALIEU'S ADDRESS

The event of the session as scheduled was an address by Mr. Mallalieu of New York, on the public service of the underwriters in time of war. Mr. Mallalieu is well known as the general manager of the National Board of Fire Underwriters and an exceptionally able and interesting speaker, as well as one whose opinions carry much weight. Because of the unavoidable absence of Mr. Mallalieu the address was read by Prof. Ira H. Woolson. Necessarily the paper was of considerable length, the subject being too great to be treated briefly. The speaker sketched the conditions existing industrially at the outbreak of the war and the three chief problems that confronted the Government at that time. The action of the National Board in providing data for Government use upon about 13,000 manufacturing plants was stated, and the subsequent action in the endeavor to keep these plants "fit" and to meet as far as possible at the outset the dangers of overspeeding and incen-

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diarism. Investigation was made of the "spy" hazard, and as a result the imminence of that particular danger was demonstrated as less than that of characteristic national carelessness, although the former hazard is by no means to be minimized. An intensive inspection of fire hazards was at once instituted, and many thousands have been visited by trained inspectors personally to great benefit. Subsequently the importance of this work was recognized by the general Government in the creation of the fire prevention section of the National Industries Commission and supplemented by the establishment of a fire prevention bureau of the National Board of Fire Underwriters in the War Department at Washington. The fire prevention work in the national cantonments was described in enlightening detail, and a brief outline of the methods adopted in the aero investigation was given. An optimistic view of possible improvement in American habits through propaganda and educational methods was expressed—an optimism it is to be hoped all may share, that conviction may speed work. This abstract is brief and incomplete, serving only partially to indicate the points of a most forcible and instructive effort.

The reports on private fire supplies from public mains, fire pumps, nomenclature, and hydrants and valves were offered and accepted. All of these were of purely technical nature, or nearly so, and evoked but slight discussion.

FIELD PRACTICE

The meeting proceeded so placidly that the casting of a veritable hand grenade by the Committee on Field Practice was almost startling. There was nothing radical in the report itself, which was really less a report than a moralization exemplifying the ought-to-be in the first section, and in the second listing subdivisions of the subject of standardizing "first aid" apparatus, including an incomplete and (according to preconceived ideas) a somewhat dislocated list of apparatus to be classified under that head and some remarks of a somewhat speculative nature, but recommending no definite regulations or procedure. The indefiniteness and indecision of the report were what set up debate, which was active for a time, although necessarily of a desultory nature, since there were no specific propositions advanced.

As a result the first section was remanded for further consideration and the second disposed of by the passage of a resolution declaring it the sense of the members present that it was inadvisable to take definite action at this meeting.

This, of course, operated to send the whole matter back for more consideration and a future report, but the discussion developed a consensus of opinion that the need was not so much a set of hard and fast requirements as of a general primer of instruction which could be used to aid the public in purchasing apparatus of a type best suited to their special needs. There would be every reason to welcome something of this sort from an authoritative source, and its preparation and use would undoubtedly avoid much purchase of unsuitable appliances by opposing sober judgment to super-salesmanship, and by putting into circulation information and instruction as to care and maintenance of extinguishers and the like in a conveniently available form. The composition of the committee is such that faith in its ultimate ability to handle even the most complex of problems in a manner universally satisfactory is fully justifiable, and, indeed, it may have been the purpose of submitting the report in this form to draw out as large an expression of opinion as possible.

Second Day's Proceedings, May 8

First in order was the discussion of zero hazards carried over from the first day's program. The experience of the winter of 1917-1918 was trying, and the number of automatic sprinkler equipments put out of commission for considerable periods was unprecedented. The winter cold was unquestionably severe, record weather in many places, but record weather by very small markings,

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hardly phenomenal; nevertheless, it was a very cold winter in the main, the period of severity was rather early in the season and unexpected, and also coincident with severe shortage of fuel, and the number of sprinkler equipments exposed was vastly greater than in any previous period of low temperature, therefore the havoc wrought was phenomenal. The discussion developed a somewhat revolutionary tendency to advocate wider use of dry-pipe systems, heretofore regarded more or less in the light of makeshifts to be used sparingly and only as necessity compelled, a preconception probably capable of much modification in the present advanced stage of the art of equipment. One somewhat novel proposition was advanced in that the determination between installing wet or dry systems should rest largely upon the latent (q. v. accumulated) heat in the contents of the room. The proposition was not fully discussed, perhaps because of the lack of time, but, as its practicability would rest mainly upon the stability in volume of contents and in the general heat conductivity of the contents, a full discussion would have been instructive, since a room full of material of low conductivity would probably maintain a fair temperature for many hours, whereas if of high conductivity the accumulated heat would be rapidly given off, and consequently the duration of the immunity from this source greatly curtailed. Some definite experiments and records with different stocks would be desirable and enlightening; for instance, a stock of woollen goods as compared with a hardware stock.

After disposal of some minor matters a telegram of a congratulatory nature from the British Fire Prevention Committee was read. The reports of the Committees on Special Hazards and Tanks were made, the latter report being wholly technical and the former stating that it is impracticable to submit anything definite because of rapidly changing conditions due to war and the impending action and investigation by the Government. The reports were not formal or printed, but were well presented in a brief address by the chairmen of the committees.

The report of the Committee on Explosives and Combustibles, which was briefly discussed, followed. The discussion naturally turned largely upon technical points and was generally participated in. The report was finally remanded for minor alterations to be acted upon by the Executive Committee.

The luncheon at the Hotel La Salle was set for 1 p. m. sharp, and, as the various discussions had consumed all available time, the meeting adjourned. At precisely 1 o'clock the members of the convention filed into the "red room" of the hotel and with but little delay proceeded to the serious business before them, which was undertaken without a word of dissent.

THE LABORATORIES

The meeting was undoubtedly of a receptive nature, and its physical part having been satisfied, it prepared for mental satisfaction. The speaking was not prolonged. H. C. Eddy, of the Underwriters' Laboratories, spoke briefly, and was followed by Prof. Louis Monin, dean of the Armour Institute of Technology, who appeared in place of Dr. F. W. Gunsaulus, president of the institute, who was scheduled to deliver an address, but was unavoidably prevented. Prof. Monin spoke extemporaneously on matters pertinent to the occasion, his many clever sallies eliciting frequent applause. This ended the set proceedings and the members departed individually and in groups to the Underwriters' Laboratories.

The constant accession of facilities at the laboratories, especially apparent to those who are able to visit them only at considerable intervals, is very gratifying. The afternoon was spent in examination of the buildings and apparatus. A test of a column was conducted, arousing much interest, and several demonstrations of automatic sprinkler operation were given. There were no formal ceremonies; each was free to come and go and ask all manner of questions, all of which were courteously and fully answered. Several persons prominent in fire protection endeavor were in attendance, among them Fire Prevention Commissioner Lewis, of Boston.

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Third Day's Proceedings, May 9

Speeding up was evident at the outset. Mr. Robinson presented the report of the Committee on Protection of Openings in Walls and Partitions, which was discussed briefly and accepted.

SAFETY TO LIFE

Then came the first leading event, the report of the Committee on Safety to Life. As compared with last year's report, less ground was traversed, this year's report being confined to factories. The report was presented by Chairman Forster in an explanatory address illustrated by lantern slide projections of plans. Naturally some discussion followed, with Mr. Forster as the target, but so patiently and thoroughly had the work of preparation been accomplished that only a few minor criticisms were established. The report finally went back for slight changes to be reported to the Executive Committee in final shape and published. Although several years of study have been given to this by very enthusiastic and exceptionally capable men, it is so difficult and complicated a matter that it is almost inevitable that practical tests will develop some weak places, although probably none of much importance. It is to be hoped that success will follow the efforts to be made to secure the enactment of this code into law by at least several legislatures, that it may be tested out to the utmost. Reform from the existing conditions is sorely needed, and in the preparation of the matter the committee has done a great public service, all the more to its credit because enthusiastically entered upon without compensation and at considerable personal sacrifice in time and effort, for which the thanks not only of the association but also of the whole community are due. It is understood that the committee will continue its labors and produce a similar code or codes for other classes.

FIRE RESISTIVE CONSTRUCTION

The report of the Committee on Fire Resistive Construction was presented by Prof. Ira H. Woolson. The report, a final revision of previous work, was remanded for minor changes to go to the Executive Committee for final approval and publication. The report (first section) is a comprehensive and thorough code for the class. The second section, largely new matter relating to fire tests and emergency housing, was presented by Prof. Woolson with an explanatory address. This brought out considerable discussion, one feature of which was the growing appreciation of the value of plaster on metal lath in fire resistive construction. The general scope of the report largely traverses the investigation and action by the War Department, and is a thoughtful document.

The Committee on Uses of Wood in Building Construction reported, and its report was adopted.

Speeding up was more in evidence at the afternoon session. The Committee on Laws and Ordinances reported definite action inexpedient at this time.

FIRE PROTECTION IN HOTELS AND APARTMENT HOUSES

The special event of the afternoon was the address by Elmer C. Jensen on Fire Protection in Hotels and Apartment Houses. An address by an architect of Mr. Jensen's caliber is always an event, and all anticipations were justified. The speaker began by expressing appreciation of the services rendered to the architectural profession by the National Fire Protection Association in impressing the need of more attention to fire hazards and safety to life. The two classes of buildings under consideration, he said, have shown until recently less improvement than most others, and in consequence there are in existence a very large number of hotels and apartment houses that are a distinct menace to life. Regarding building codes, the address is quoted in full as a comprehensive expression of conditions and remedies:

"Our larger cities are only fairly well protected in the matter of new buildings, through more or less intelligent and effective building and other regulations having for their purpose safe building, but the smaller cities and towns have, as a rule, comparatively little or no protection other than that afforded by the character of the professional services employed, if any, or the wishes of the building

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owners. Too much emphasis cannot be placed upon the necessity of every State having a building code that will at least require the recognition of those essential and common principles of safe construction that are now generally recognized by all authorities on building matters, and in this connection it may not be out of place to state that the American Institute of Architects has for a number of years had a Committee on Basic Building Code. Your association could effectively cooperate in this most important work.

"In apartment houses and hotels those types of construction that are safest for the community and the occupants, and at the same time give the owner the greatest measure of protection against fire loss and accidents to life and limb, should be conceded to be the most desirable. This character of building may, in some cases, be considered as inconsistent with the owners' views on good investment, owing to high cost, and therefore may call for some recession from the highest standards. There are, however, some fundamental or cardinal principles, the enforcement of which should, in every case, be insisted upon. They are, briefly: Sufficient number and area of exits; stairs, elevators and other shafts enclosed with fire-resisting materials; proper protection against exposures; proper safeguards in lighting systems, and use of sprinkler systems in basements and other spaces where storage of combustibles is common or necessary.

"There can be little doubt that if statistics were at hand it would be found that most of the lives lost and property loss suffered in fires in the character of buildings under discussion were chargeable primarily to the omission of all or some of these important safeguards or to their improper use.

"It does not follow that other safety measures are unnecessary or undesirable, but the fact nevertheless remains that these safeguards are indispensable and of the very first importance, although it may be conceded that in buildings over a height of three or four stories fire-resistive construction should be placed first on the list. So-called common construction is not here advocated, but, inasmuch as it is a type that will still be used to a very considerable extent, its treatment should not be overlooked, at least until the rapidly diminishing gap between the cost of common and fire-resistive construction has been practically removed."

Mr. Jensen discussed the matter of comparative cost, expressing a belief that it is needlessly large, owing to the tendency in new construction to follow preceding types, such as following wood dimensions in metal work where unnecessary for strength, and he predicted a better recognition of the true qualities of materials in the future.

Safety to life should take precedence of all other considerations, not to intimate that fire protection is not a life safety measure, but that it should be to some extent subordinated where conflict arises and first required to the fullest extent regardless of any consideration, economic or otherwise. It is recognized that at times this principle, if carried to its logical conclusion, would not secure the maximum of protection against property loss.

Proceeding to the discussion of hotels: They are divided into three classes—the comparatively small ones in small towns and cities, generally of ordinary construction and from 3 to 7 stories high; the second, found in cities of the second, third and fourth class, from 8 to 12 stories and of fire resistive construction; and the third, fire resistive structures, often from 12 to 20 or more stories in first class cities, many of very high grade construction.

We devise our ideas of safety and fire protection from experience, and these crystallize but slowly into regulation. In respect to common defects, the speaker said:

"Many of the above described buildings contain very glaring defects which may profitably be mentioned to show what not to do and what to avoid. A very flagrant one is the ugly and usually neglected back porch, built of wood and as cheaply as possible, and usually going with the open frame stairs. We also find the narrow winding wood stairs in many cases open into a basement and with ordinary partition and wood door enclosures; basements often without any ceiling whatever and usually without any enclosures of rooms than frame partitions; store rooms often full to overflowing with inflammable materials and with partitions of wood slats and with no artificial means of lighting, tempting use of candles and matches; so-called vent and light shafts with stud partitions and wood frames and sash; no fire stops of any kind in joists or partitions. These features are only a few of those that are common in our so-called modern flat buildings.

"In many of our existing hotels, some of no mean size, we find conditions positively opposite to those we have learned to be essential to safety. To cite only a few: Basements with no ceilings, or with ordinary plaster on wood lath; no sprinkler systems; stairs entirely open; corridors without daylight and with ordinary partitions and wood doors; ladder fire escapes; open shafts and shafts with stud partitions and wood windows.

"Does this not spell the necessity for improvement and much to do for those who understand the necessities?

"It is from experiences in such a variety of

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buildings that we have gradually been crystalizing our thoughts on safety and fire protection and putting them into action in the shape of regulations and sometimes in the shape of buildings in advance of regulations."

Protection of buildings where people sleep appears to be of greatest importance, since the public assume ("have a right to assume") that security is guaranteed by public officials, although this impression is necessarily erroneous at the present time. The basic requirements advocated are:

In Apartment Houses:

All porches, stairs and their enclosures, of incombustible or fire-resistant material. At least two separate exits for every apartment.

In basements, all partitions to be of incombustible material and ceilings plastered on metal lath and equipped with sprinkler systems, with artificial lighting by electricity only.

Vent shafts with fire-resistant enclosures and metal windows. Small courts with exposures on more than two sides to have fire windows.

Limit of height of common construction, three stories.

Fire stops in all floors and partitions.

In buildings over three stories in height:

In addition to the above, where they can apply:

Fire resistive construction throughout.

Stairs and elevator shafts enclosed with fire-resistant partitions and with metal doors; in stairs to be self-closing and in elevators with approved safety on door, preventing opening until elevator stops at landings.

Public corridors to be ventilated by means of ducts and fans to draw off smoke to prevent filling stair shafts. Metal doors for communication to each apartment.

Wood floors eliminated as far as possible.

No wood wainscoting.

Kitchen, pantry and wardrobe equipment, where large amount of wood is usually used, to be of metal.

Outside stairway fire escapes used in lower four stories only; above that point use smoke tower stairs.

Fire standpipe in stair tower.

Sprinkler system in service quarters.

Fire windows on all exposures within 25 feet of other buildings that are protected in like mannar, with the addition of automatic shutters or outside sprinklers where such adjoining buildings are not equipped with fire windows or equal protection.

Stairways or horizontal or stair tower exits to be not more than 150 feet of travel distance apart.

Approved fire alarm system from each corridor connecting with office or engineer's quarters, to be located at each stairway exit.

Hotels—Same as apartment buildings, three stories in height, with following additions:

Fire-resistive construction regardless of height;

No wood floors;

No assembly halls above second floor;

Windows to outside at ends of all corridors and not more than 150 feet between ends;

Shops or business quarters with combustible contents confined to first story or separated from lobbies and corridors with fire doors;

Stairs from lobbies either enclosed or cut off at intermediate landing with fire doors..

The following statistics from a reliable source are added for general interest. They are not complete either as to number of lives lost, number of fires or property loss, nor do they include the property loss where the buildings were entirely destroyed:

Killed and Injured in 1917—

In Hotel and Apartment House fires:

Killed	44
Missing	2
Injured	7
	53

January to April (inclusive), 1918—

Killed	16
Missing	8
Injured	14
	38

Hotels and Lodging Houses:

Year	Total Loss	No. of Fires
1908	$8,507,200	232
1909	7,341,800	238
1910	5,358,000	121
1911	5,182,850	205
1912	6,746,510	302
1913	8,658,268	323
1914	6,128,400	312
1915	4,951,850	363
1916	7,186,400	324
1917	3,272,500	133
Total	$63,333,778	2,553
Average loss per fire		$ 24,807.59
Average loss per year		6,333,377.80

Apartment Houses:

Year	Total Loss	No. of Fires
1914	$ 935,975	63
1915	377,000	51
1916	1,040,000	58
1917	316,500	18
	$2,669,475	190
Average loss per fire		$ 14,049.86
Average loss per year		667,368.75

Resort Hotels:

Year	Total Loss	No. of Fires
1914	$3,233,750	69
1915	994,000	34
1916	1,247,500	20
1917	220,500	7
Total	$5,695,750	130
Average loss per fire		$ 43,813.44
Average loss per year		1,423,937.50

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Losses in Hotel, Lodging and Apartment House Fires in 1917:

Total fires reported	116
Total losses reported	$3,349,000
Average loss per fire	$28,870

January-April, 1918:

Total fires reported	57
Total losses reported	$2,649,500
Average loss per fire	$46,482

The discussion was spirited but brief, expressing a general approval and appreciation. It is certainly gratifying and a sign of progress when architects of the first grade become interested in applying the principles necessary for safety to life to these structures, and much has been accomplished. Hotel construction in the past has been nearly as much a matter of fashion, as shoes or clothing, the chief object being attractiveness. Many years ago a hotel was built that became extremely popular, and the type—exemplified by the Newhall House in Milwaukee and the Globe Hotel in Syracuse, N. Y.—was repeated very extensively. I quote these two as conspicuous for the extremely heavy loss of life in their burning. It was perhaps these disasters that set up a demand for greater security that has been slowly increasing until at this time safety is one of the essential features of popularity; but apparently it was not at all considered 60 years ago. Fashion still governs: witness 12 stories or more in hotels in third class cities. But fire-resistant construction, thanks to the efforts of the broadening vision of the leading architects, is by no means confined to this type, to the honor of the profession.

OTHER DISCUSSIONS AND REPORTS

Mr. Jensen was followed by Sidney J. Williams, engineer of the Industrial Commission of the State of Wisconsin, who spoke briefly and instructively of the essential features of building codes.

The reports of delegates to conventions of other bodies were next received, interest centering chiefly on that of the delegates to meetings of the Department of School Administration of the National Educational Association. Repeated disasters with deplorable destruction of life in schoolhouses have been distressingly frequent, and the peculiar helplessness of little children makes a powerful appeal. They are in a sense prisoners, since they may not exercise any choice and are not capable of choice; hence their presence is not of their own volition or because of their judgment.

In the somewhat active discussion one notable speaker was Insurance Commissioner J. R. Young, of Raleigh, N. C. Mr. Young is prominent in the endeavor for betterment and thoroughly in earnest, speaking always effectively and directly to the point. He discussed, among other things, the Asheville (N. C.) disaster, where several children were burned. He brought for distribution some valuable publications bearing on the subject of school betterments.

MOTION PICTURE FILMS

The hour of adjournment was drawing near, and more speeding up was in order. Deferred reports and new business were rapidly disposed of with little debate until a resolution was introduced calling upon the Committee on Public Information or whatever committee the Executive Committee should designate to endeavor to secure congressional, State and municipal action to the end of prohibiting entirely the manufacture, storage and use of inflammable picture films. There seemed for the moment a probability that the resolution would pass practically undebated, but the convention awoke to the fact that such legislation, however desirable (there was no dissent as to desirability), would be destructive legislation. The moving picture industry is enormous, employing immense capital and many thousands of persons, and because of the impossibility of supplying the demand for films of the non-inflammable sort any such laws would practically destroy it. This was brought out clearly, as well as the fact that the public demand for this form of entertainment (moving pictures) is so great that any attempt at restrictive legislation which would involve appreciable curtailment would have little chance of success. The general expression was that every effort and influence should be exerted to secure such increase in the production of non-flammable films as will permit in future

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of drastic action in the direction of suppressing inflammable kind.

ELECTION OF OFFICERS

The convention then proceeded to the election of officers for the ensuing year, the list as reported by the Nominating Committee being chosen unanimously. It was as follows:

President, F. J. T. Stewart, New York.

First Vice-President, H. O. Lacount, Boston.

Second Vice-President, W. E. Mallalieu, New York.

Secretary-Treasurer, Franklin H. Wentworth, Boston.

Chairman of Executive Committee, H. L. Phillips, Hartford.

Executive Committee (for three years), Gorham Dana, Boston; H. W. Forster, Philadelphia; Rudolph P. Miller, New York; H. L. Phillips, Hartford; A. R. Small, Chicago; John B. Laidlaw, Toronto (for one year).

Nominating Committee, 1919 (three members), R. H. Newbern, Philadelphia; Frank D. Chase, Chicago; C. Heller, San Francisco.

The customary ceremony of induction followed, after which the meeting adjourned.

Comments on the 1918 Meeting

The meeting, as a whole, was successful, accomplishing considerable and, as before remarked, preserving the continuity of effort so necessary to success. War conditions necessarily affected attendance, but not enthusiasm. It is a regrettable feature of most deliberative bodies (the Congress of the United States included) that the time necessary for careful consideration of many matters exceeds that allotted and measures introduced in the closing period that would not receive complete approval without amendment may get through unamended. This is especially the case where members coming from a distance and having pressing business at home rely upon the prearranged schedule and secure reservations upon trains leaving very near the scheduled hour of adjournment, so that often the representation is much depleted, sometimes to very near, if not below, a technical quorum. This always carries with it the danger that some situation may arise in which by taking advantage of such conditions a small minority may be able to commit a majority to some project that would be promptly rejected on a full vote.

A fairly successful method of minimizing this is to require the presentation of new business at the close of the first day's session, making it necessary to secure a formal vote of permission to introduce any new measure other than such as is logically consequent upon some report or recommendation of a committee during the closing hours. The suggestion is offered, without the least desire of interference, as a possible betterment, and, since "new business" rarely originates in the course of a convention, is apparently practicable. Speeding up in the consideration of previously printed committee reports is comparatively easy because there has been already time for consideration, and those who have anything to say know in general just what they want or propose to say, and if necessary the final approval of such reports can be shifted in many cases upon the Executive Committee, but this is not true of any entirely new proposition, especially one demanding immediate action.

The trend toward a larger featuring of safety to life continues evident and promises large accomplishments in the future.

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Saving Lives and Property by Fire Protection

Selections from the Proceedings of the National Fire Protection Association

HIGH HAZARD OCCUPANCIES.—*Committee on Safety to Life:* Occupancies involving the storage or use of materials which are liable to burn with extreme rapidity or from which poisonous fumes or explosions are to be apprehended in the event of fire. The following list indicates the types of occupancy coming within this class: Artificial flowers, artificial leather, carpet linings, celluloid, cereal mills, chemicals of all kinds (except where serious flame, fume or explosion hazards are not present), clothing (cotton), cotton batting, cotton waste, dry cleaning, explosives, feather renovating; feed, flour and grist mills, fireworks, imitation leather, matches, rag sorting (cotton), shoddy mills, starch mills, straw goods, varnish, woodworking (with dipping or varnishing).

INDIVIDUAL LIABILITY FOR FIRES.—*Committee on Public Information:* For the purposes of the campaign the association's pamphlet covering the subject of individual liability was revised and enlarged, and the co-operation of individual members in something like 100 cities was then sought. The members thus approached were asked to bring the matter before the authorities in their several cities, and the committee feels that the results are distinctly encouraging. Although it cannot at this time record any further instances of the enactment of ordinances as the result of its efforts, the committee has reason to believe that certain cities may soon take favorable action. Even should this expectation be disappointed, the educational value of the work done will have been very great. In city after city the personal attention of the mayor, of members of the city council or of city officials has been drawn to the civic problems created by preventable fire, and the local introduction of our ordinance has naturally provoked discussion both in the newspapers and among the citizens. Where legal difficulties stand in the way—as has been found to be the case in several of the most promising centers of activity—these have been laid bare and preparations are being made to remove them. In California, Iowa and New Jersey it seems that State legislation is necessary to the enforcement of individual liability. Accordingly, bills are to be introduced in the next sessions of the legislatures of those States. In New Jersey, at the instance of the Department of Public Safety of the City of Trenton, a bill was introduced this year, and its failure to pass has stimulated the local campaign of education. Insurance Commissioner James R. Young has conducted vigorous propaganda throughout the State of North Carolina, and Fire Marshal T. Alfred Fleming has warmly commended the Cleveland ordinance in one of his bulletins to the citizens of Ohio.

SAFEGUARDING OUR SOURCES OF SUPPLY.—*W. E. Mallalieu:* We firmly believe that innumerable factories, grain elevators and other points of production or storage are now in the nation's industrial trenches instead of its hospitals or graveyards, because of the work done in the National Board of Fire Underwriters' fire prevention campaign. This work has been given a permanent official standing by the Federal Government through the establishment of a Fire Prevention Section of the War Industries Board, operating directly from its offices in Washington. There has been some misunderstanding of the exact function of this new section. It is not intended in any way to disturb existing agencies where the inspection work that they are doing is satisfactory. In fact, the efforts of the section will be directed

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principally toward improving conditions in certain privately owned plants where munitions needed by the Government are being produced under unnecessarily hazardous conditions. There are perhaps from one to two hundred of these plants, and wartime needs demand that they be safeguarded as swiftly and completely as possible.

All organizations and individuals interested in the subject of fire protection are urged to co-operate by reporting upon any plants of which they may happen to know. The whole subject of safeguarding our sources of supply in this highly industrialized war is so vast that the combined efforts of all who may contribute will still fall short of complete protection. It is a field of patriotic service which cannot be overcrowded.

FLOOR AND ROOF TESTS.—*Committee on Fire-resistive Construction:* For floor and roof tests the sample shall be of such a size that the minimum span of the supporting beams of the floor arch shall be twelve feet, and the supporting beams and girders shall have a clearance of at least eight inches from the walls of the test structure. The floor may be tested as soon after construction as desired, but within forty days. Artificial drying will be allowed if desired. If the construction is to be plastered in practice, the sample shall be plastered in the same manner. The floor shall be loaded so as to develop in each member of the construction stresses up to the maximum working stress allowed in the material of the member.

The test shall not be regarded as successful unless the following conditions are met: (a) No fire shall have passed through the floor or roof during the test. (b) The floor or roof shall have safely sustained the full rated safe working load during the test. (c) After a fire test that has not been carried to failure, or after a combined fire and water test, the floor or roof shall sustain safely the dead load plus at least two and a half times the designed live load applied not less than twenty-four hours nor more than seventy-two hours after the completion of the fire test. (d) If the fire test has been continued to failure, the failure shall not have occurred within a period of 25 per cent in excess of the period for which classification is desired.

NUMBER AND CHARACTER OF EXITS.—*Committee on Safety to Life*: Two means of exit remote from each other must be provided from every building or section. Above the second floor one of these must be an inside stairway or a smoke-proof tower, and the other may be an inside stairway or a smoke-proof tower or a horizontal exit or an outside stairway, except that where a building or section has horizontal exits to two or more buildings or sections, in or through each of which access may be had to an inside stairway or a smoke-proof tower, no inside stair, smoke-proof tower, or outside stairway need be provided.

Exits shall be so arranged with regard to floors that there are no pockets or dead ends of appreciable size in which persons might be trapped.

Doors giving access to means of egress must swing with the travel or slide across the travel, and there shall be no obstruction to stairs or on stairs or on landings; provided, also, that swinging doors during their swing shall preferably not reduce the effective width of the stairs or landings, and the swinging doors when open shall not interfere with the full use of stairs.

AUTOMATIC DOORS.—*Committee on Protection of Openings in Walls and Partitions*: Where the conditions are such that the spread of fire through the wall openings is likely to be rapid, or where the spread of fire through wall openings is likely to endanger life, or where the property values warrant, the fire doors should be operated by an approved automatic quick-operating door closing device. Where the conditions are such that the possibility of the rapid spread of fire through the wall openings is negligible, and where the spread of fire through such openings is not likely to endanger life, the fire doors may be operated by a less sensitive approved automatic door closing device. It should be noted that the question is not so much that of rise of temperature as of rapidity

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of spread, and that in all situations where a rapidly spreading fire appears possible, the sensitive device should be used. Such situations include those where there is a liability of a train of flammable material leading through the opening, or where highly flammable material is stored on each side of the opening in such close proximity to it that fire could jump through the opening before generating sufficient heat to operate the door closing device.

SAFE HOTELS AND APARTMENT HOUSES.—*Elmer C. Jensen*: To attempt to state that precaution for the safety of life is more important in one class of buildings than in others may be dangerous, but it does seem as though if a preference is to be given, it should be to buildings where people sleep, and in many cases, unfortunately, with a false sense of security. The public have a right to assume that when they are permitted to occupy buildings for any purpose the security of the buildings is guaranteed by the public officials.

PROTECTION OF VERTICAL OPENINGS.—*Committee on Safety to Life*: Open stairs are those which are without enclosures of any kind or those which have enclosures sub-standard as to fire-resistive power or method of arrangement. Stairs adequately enclosed or protected are inside stairs with standard enclosures, smokeproof towers of standard design, or outside stairs properly protected against fire within the building. Buildings in which all vertical openings are protected are those in which, in addition to stairs, the light walls, elevator shafts, dumb waiter shafts, and all other important vertical openings are protected in the manner set forth below. In every type of building construction erected after (date of enactment of rules), stairs and vertical openings may be enclosed or protected as set forth in Sections 90, 91 and 92 in the fourth edition of the Building Code recommended by the National Board of Fire Underwriters. In buildings of joisted or quick burning construction erected after (date of enactment of rules), stairs and other vertical openings may also be enclosed or protected as set forth in Section 93 of the above-mentioned building code. In buildings of joisted or quick burning construction erected prior to (date of enactment of rules), stairs and other vertical openings may be enclosed as set forth in Section 94 of the above-mentioned building code.

SAFETY DAY IN 1917.—*Committee on Fire and Accident Prevention Day:* The exceptional circumstances of the year 1917 presented a somewhat difficult problem to the committee. While it was clear, on the one hand, that no effort for the reduction of the national fire and accident waste ought to be abated, there was, on the other hand, considerable reason for doubting whether, amid the great variety of calls for public service, it would be possible to mobilize sufficient interest and energy for the proper observance of October 9 along the lines heretofore adopted. After careful consideration the committee came to the conclusion that while it would not be worth while to issue any poster for general use, the time was opportune for the preparation of a booklet of suggestions for organizations and individuals planning observances. These were issued with a reprint of Mr. Wentworth's admirable "Fire Prevention Day Programs." Although the subject matter of the booklet was fire prevention only, a note was placed on the cover referring readers to the National Safety Council for suggestions regarding accident prevention exercises. A number of copies were distributed through the agency of the National Safety Council and inquiries regarding fire prevention exercises were referred by the council to the committee.

WOMEN'S WORK FOR SAFETY.—*Committee on Fire and Accident Prevention Day*: An earnest effort was made by the committee last summer to interest the women's clubs in a work so much in line with their general efforts for conservation, but with less success than had been hoped. Advices from North Carolina, however, indicate that the clubs of that State have rendered good service, and in Oshkosh, Wis., the Business Women's Luncheon Club

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took the whole affair in hand with such success that the citizens now demand that the club shall make the observance a regular institution. Several women's clubs were also active in the Chicago celebration, but their participation was the result of the efforts of a devoted band of workers in Chicago rather than of this committee directly. While realizing the value of individual interest and initiative and the dangers of overstandardization in matters of this sort, the committee is greatly impressed by the plans of devolution adopted in Chicago. No fewer than fourteen separate committees were appointed to be responsible for different features of the observance. A similar division of labor and responsibility is strongly recommended by the committee wherever conditions permit.

ACETYLENE UNDER PRESSURE FOR WELDING.—*Committee on Explosives and Combustibles:* In systems using dissolved acetylene under pressure, Section 32 shall apply. Storage cylinders inside buildings shall be limited as far as practicable to those in actual use, or enough additional cylinders to complete one day's supply. When through with cylinders, they shall be removed from the premises and returned to the manufacturer for recharging as rapidly as practicable. Cylinders in excess of those mentioned should be stored in fire-resisting buildings or vaults or rooms which shall be used for no other purpose and shall have no open flame for heating or lighting and which must be well ventilated. When cylinders are not in use, outlet valves shall be kept tightly closed.

In those installations where compressed acetylene from a number of cylinders is supplied from a manifold to a system of shop piping, the storage cylinders that are manifolded should, whenever practicable, be placed outside of the building. Adapters, if used to connect fittings to cylinders containing gases under pressure, shall be of substantial design and construction, and shall be of sufficient strength to afford ample factor of safety in the service intended. Acetylene and oxygen cylinders in use for welding or cutting, if exceeding 100 pounds gross weight, shall be rigidly fastened to a structural part of the building, or to an approved portable wheeled conveyor. No acetylene or oxygen tank shall be transported or lifted by crane or derrick a distance of more than 4 feet from the floor. No acetylene generator, when charged, shall be moved by a crane or derrick.

NON-BEARING PARTITION TESTS.—*Committee on Fire-resistive Construction*: For partition tests the area of the sample shall be not less than 100 square feet and no dimension less than 9 feet. Temperatures on the outer surface of the sample shall be read by thermometers, not less than five, symmetrically disposed and placed against the surface of the sample with their bulbs properly protected against radiation of heat. The distance of the nozzle from the sample during the application of water shall be not more than twenty feet when the hose stream is applied approximately normal to the surface of the sample which distance shall be reduced by one foot for each ten degrees of angle from the normal when the hose stream is applied at an angle to the surface of the sample.

SPECIFICATIONS FOR EXTERIOR SCUPPERS.—*Committee on Tanks*: To be made of cast iron or some similar material sufficiently strong to withstand the strains and pressure to which it may be subjected in use. To extend a sufficient distance beyond the outside wall so as not to be readily sealed by ice. The outer end to be so designed that drafts may be avoided and that materials falling from above will not readily injure or clog the outlet. To be so designed that it will not be subject to clogging by birds and insects. Any check valves used to prevent drafts to be not readily subject to corrosion or sticking. To be so designed that the inlet will not be readily obstructed by storage. This may be done by making the inlet of a convex shape or by providing projections which will prevent stock from being stored close to the inlet. Inlet to be screened by vertical bars, of a removable

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type, not over 2 inches or less than 1 inch apart. Scupper to be designed so that it can easily be set at floor level and so that the proper incline, if any, toward discharge will always be maintained when set in the wall. Design to be such that it will not readily open, warp or fuse when heated and will prevent the entrance of flame even under severe conditions.

HOTEL AND APARTMENT HOUSE CONSTRUCTION. — *Elmer C. Jensen*: Safety of life should take precedence of all other considerations, even of fire protection, which in many cases would be considered simply as an additional precaution and having for its purpose an economic end. This statement is not intended to imply that fire protection is not a life safety measure, but simply to discriminate between that which is necessary as a life safety measure and that for the avoidance of property loss. The first should be required to the fullest extent regardless of cost, while the second could properly be regulated or determined largely by economic considerations.

THE HAZARD OF FREEZING.— *Committee on Field Practice*: Freezing hazards must be safeguarded, especially in instances where soda and acid extinguishers and other devices not containing non-freezing solutions are located, and in which it is known non-freezing solutions are impracticable.

In the absence of any other acceptable method, it would appear that the only other simple means of guarding against freezing would be the requirement of frost-proof cabinets in which to keep these devices.

Common salt and calcium chloride are probably the least expensive agents to prevent water from freezing.

Denatured alcohol would no doubt create an inflammable mixture and would be subject to evaporation.

Glycerine is said to be too expensive for this purpose.

Recent laboratory tests, and tests elsewhere, have plainly demonstrated that calcium chloride is impracticable for use in connection with soda and sulphuric acid mixtures, hence this agent should never be used in connection with this type of extinguisher.

Calcium chloride may be used, however, with water casks and pails. Where this solution is used, wooden barrels should first be well coated inside with asphaltum or with a mixture of crude paraffine resin to prevent shrinking of staves and consequent leakage.

The following table shows the temperature at which water will freeze with given quantities of calcium chloride in solution. It also gives degrees Salometer and degrees Baumé at 60 degrees Fahrenheit:

Pounds per Gal. of Water	Temperature of Freezing	Degrees Salometer	Degrees Baumé
½	+29 Fahr.	13	3
1	27 "	27	6
1¼	25 "	36	9
1½	23 "	40	10
1¾	21 "	44	11
2	18 "	52	13
2¼	14 "	62	15
2½	+3-4 "	80	20
3	—1-4 "	88	22
3½	—8-11 "	95	24
4	—17-19 "	104	26
4½	—27-29 "	112	28
5	—39-41 "	120	30
5½	—50-54 "	124	32

Common salt has been recommended by a few manufacturers for extinguishers. It is said that salt does not lower the freezing point sufficiently to be of very great use in average cold weather. It will attract and rust metals with more or less rapidity, and is sometimes objectionable in being subject to crystallization.

The following tables may be applied with water in wood receptacles: Use one pound of salt to 18 gallons of water. Add four ounces of salt to this solution for every degree Fahrenheit below 30. One gallon of water weighs 8.35 pounds.

Another table (Sodium chloride):

Pounds per Gal.	Freezing Point—Degrees Fahr.
½	24 above zero
1	18 " "
1¼	15 " "
1½	12 " "
1¾	9 " "
2	6 " "
2¼	3 " "
2½	1 " "
3	3 below zero
3½	8 " "

This solution should be mixed in a vat before being placed in barrels, care being exercised to see that the salt is entirely dissolved. If dumped into a barrel and

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covered with water, or if thrown into a barrel of water, the salt will be only partially dissolved and unsatisfactory results obtained. Barrels with wooden hoops should be used, as salt will corrode steel hoops or steel tanks.

STOPPING FIRES AND ACCIDENTS.—*Committee on Fire and Accident Prevention Day*: The committee loses no opportunity of stressing the serious aspects of Fire and Accident Prevention Day. It is our belief that every celebration should be the starting point for some definite piece of fire prevention work to be accomplished by October 9 of the following year. The precise nature of the task to be undertaken will vary with the locality, and no attempt has up to the present been made in the direction of standardizing this feature. The committee looks forward, however, to the time when, by coordinating the observances, it may be able to take a well-defined part in some great drive for the general adoption of particular legislative or administrative reforms endorsed by the association.

SPECIAL FIRE PREVENTION COMMITTEES.—*Committee on Public Information*: Realizing the tremendous importance of fire prevention in industry during the present emergency, the chairman of the committee communicated early in the year with a number of the association's organization members, urging them to form special fire prevention committees with a view to the reduction of fire hazards in the industrial fields from which their membership is drawn. The committee has also co-operated, as it has had opportunity, with the newly-appointed Fire Prevention Committee of the National Association of Insurance Agents. Mr. Frederick V. Bruns of Syracuse is chairman of the new committee, and his idea is to have every agent throughout the country turn to account the unique opportunities afforded by his business for rendering service to the community as a whole in matters of fire prevention and fire protection. In pursuance of this aim Mr. Bruns has addressed numerous meetings, and he misses no occasion to urge upon his fellow agents the desirability of participating, both as individuals and through their local organizations, in the work of the N. F. P. A

USE OF WOOD IN ROOFS.—*Committee on Uses of Wood in Building Construction*: Roofs shall be of plank and timber construction and either flat or of saw-tooth form. The pitch of the flat roofs shall be sufficient for proper drainage. Plank shall be not less than 2½ inches thick (nominal) splined, or tongued and grooved. Timber shall be not less than 6 inches (nominal) in either dimension, and preferably shall be single stick and with the edge beveled. Both roof timbers and planks shall be self-releasing at their support on the walls. Saw-tooth form of roof and other trusses having iron tension members and other metal connection details shall be permitted only in sprinklered buildings. All exposed woodwork shall be planed smooth. Roofing shall be of metal, tile, asbestos, tar or asphalt and felt covered with slag or gravel or approved composition.

DEFINITIONS. — *Committee on Nomenclature*:

Automatic Door.—The term "Automatic Door" indicates a door which closes automatically by means of a device operated by heat.

Automatic Window. — The term "Automatic Window" indicates a window which closes automatically by means of a device operated by heat.

Fire Door.—The term "Fire Door" indicates a door, frame and sill which will successfully resist fire in accordance with the specifications established by the Joint Conference on Fire Tests.

Fire Shutter.—The term "Fire Shutter" indicates a shutter which will successfully resist fire in accordance with the specifications established by the Joint Conference on Fire Tests.

Fire Window.—The term "Fire Window" indicates a window frame, sash and glazing which will successfully resist fire in accordance with the specifications established by the Joint Conference on Fire Tests.

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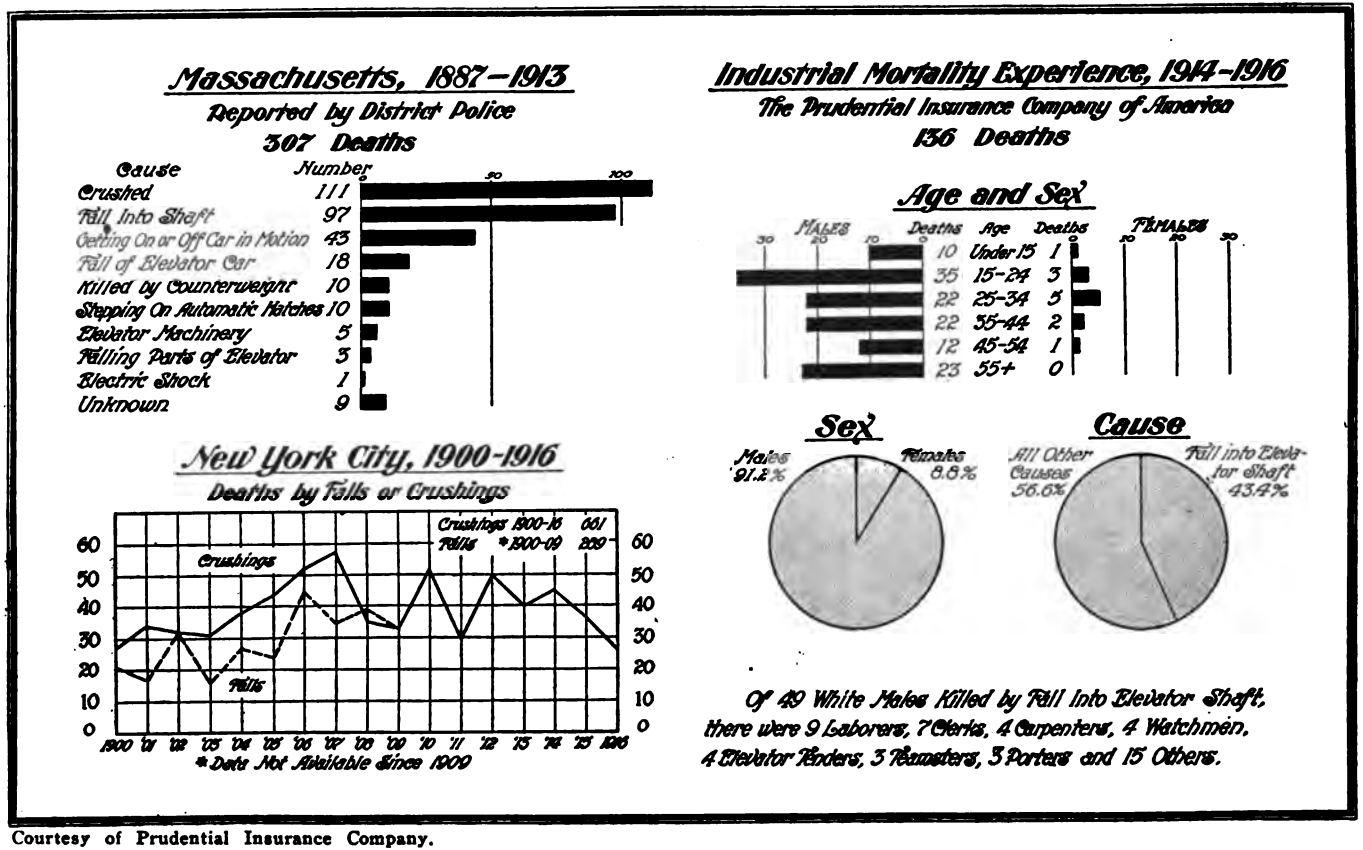
Elevator Fatalities



Courtesy of Prudential Insurance Company.

The Prudential Insurance Company of America, under the direction of Dr. Frederick L. Hoffman, its statistician, has prepared a series of charts of very great value to all persons interested in the prevention of accidents. Through the courtesy of the Prudential, a number of the charts have been published in SAFETY ENGINEERING.

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Wooden Ash Barrels and Garbage Houses

By C. E. Worthington
Wellesley Hills, Mass.

IT not infrequently happens that when we approach a seemingly simple problem from a definite viewpoint, say of fire prevention, we find as we progress that it speedily becomes almost hopelessly entangled with apparently unrelated problems and that any effective remedy involves more or less of an upheaval of established customs.

Summer and winter the wooden ash-barrel and the wooden garbage house are with us. In the winter its most striking activities are in cellars where, often flanked and encircled by accumulations of combustible rubbish, a considerable damage may be inflicted, not to mention personal danger, if ignition occurs at night. In the summer, beginning with early spring and ending with the first deep snow, it flourishes in the back yard, with fences, sheds and piazzas for aids.

The external fires are often serious, extending to several buildings in dry and windy weather, sometimes reaching the dignity of extensive conflagrations of considerable frequency and generally alarming in their possibilities.

If it was merely "abolish the wooden ash barrel" or "abolish the wooden garbage house used for ashes as well as garbage," considered merely as a completely detached proposition, it might seem that something energetic as to propaganda might take effect.

But when we take up the matter of the ash barrel in the cellar we are first met by the item of expense. A good iron ash can costs from $2 to $3 and must be purchased from a store, involving a little time and trouble in the visit and selection, while the cost of wooden barrels varies from nothing at all to 35 cents, and besides they are generally providable without much effort or sacrifice of time; the barrel is always a handy receptacle, put into use, perhaps, as a temporary expedient until time and money can be found for supplying an iron one. It answers the purpose and, for a time, nothing happening, the original intent is forgotten.

Courtesy of Penn Metal Company, Boston.

Fig. 1

Also there is the absolute certainty that exists in the mind of the user that

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hot ashes *never* get into the barrels, even when transferred to them directly from the furnace. Other persons may be careless in that respect but he will not be. Generally coupled with this belief is an assumption that the removal of ashes is strictly a personal matter; he overlooks the possibilities of sicknesses and absences and of emergency help.

These problems, if they were all, could probably be overcome by a persistent campaign of education, at least to a great extent, and particular hazards minimized.

Courtesy of Penn Metal Company, Boston.

Fig. 2

But we are confronted with a more serious obstacle. "No Man's Land" — the common territory in houses occupied by more than one family for the condition of which no one in particular is responsible, in general comprising parts of tenements with from two to eight tenants, since if more than that number there is usually a janitor who has some responsibility and is somewhat amenable.

The ash barrel and rubbish hazard in tenement basements appears to keep pace with the proportion of such tenements, at least a superficial study of the fire reports of the larger cities indicates that fact.

In such cases the landlord has little control. Often he never visits the house personally or only at long intervals and each tenant is apt to regard any effort for order or tidiness as work for someone else's benefit.

The German method of imposing a considerable fine upon *both* landlord and tenant for fires of that class certainly has had a salutary effect and possibly the growing doctrine of individual responsibility, now finding some expression here and there in local legislation, may serve to reduce this hazard, a possible result that by no means obviates the present need for an educational campaign.

The wooden garbage house is a different problem. Here the hazard of a completely isolated garbage house of ordinary dimensions is negligible except to itself and contents. Urban space for complete isolation is not always to be had and isolation means some distance to be traversed. So very frequently garbage houses are in contact with the dwelling or piazza or built against a closely adjacent wooden fence. Hence it happens when the garbage house burns that it ignites the fence, which communicates to rubbish in the back yard and to the house, even if the contact with the house is not direct. The fire possibilities are as great as those of the stable lantern, the combination of circumstances making for a great calamity being rare.

Here we become at once entangled with sanitation and the "city beautiful," the cleaning of back yards being largely dependent upon the removal of board fences and the exposure of the yards to public view. Few persons are ashamed of what nobody sees. Much success has

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been obtained in this movement in some cities and the hazard of the irresponsible tenant has been modified considerably.

It is, however, to the owner or landlord that we must primarily resort, and since compulsion is impracticable every possible argument on every possible occasion must be used to secure better conditions.

That an all-metal garbage house is more sightly and more durable than a wooden one is not subject to any dispute, nor is the fact that hot coals deposited in an iron barrel in an iron house can be productive of harm only under very unusual conditions. The chief objection appears to be the alleged expense, which is not a very good objection.

Courtesy of Penn Metal Company, Boston.

Fig. 3

In order to test the validity of this objection, inquiries were made of a number of carpenters and builders as to the cost of an ordinary garbage house large enough to hold one ash barrel. To these inquiries a considerable number of replies were received ranging between $15 and $20, exclusive of concreting the floor.

A similar number of inquiries were made of constructors of metal houses, garages, etc., without apparently exciting any interest except in one instance in which the firm recognized, in the question, a movement for better fire protection and conservation and put itself to some trouble to devise a low-price convenient house. The only available response to date was received from a well known concern having offices in many cities and consequently generally available. Its quotation is as follows:

> "We have at last produced a building of panel, or 5/8-in. corrugated design, in the same size as recently given you, which would be very rigid, durable and fireproof, for the price of $26. This building would be of galvanized steel, spot welded in one solid sheet, and bolted to angle iron frame. The door would be hinged in front, swinging outward with a hasp, that could be padlocked if necessary. There would be no floor to this type of building, as we take it for granted that the majority of these would be placed either on the earth or on a concrete foundation."

It will be seen, therefore, that the "excessive cost" is merely a bugaboo, a false assumption readily disproved; a matter of $10 applied to the fire protection of a house costing from $2,500 upward bears so little proportion to the value to be conserved as not to be worth considering, especially as the better appearance and the greater durability of the metal house can be conceded without argument. (See Figs. 1, 2 and 3.)

A persistent educational campaign embracing this as one of the numerous easily eradicable hazards is the most

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evident course, but beyond that there is no evident reason why a prohibition of wooden garbage houses should not be as integral a part of building ordinances as the prohibition of shingle roofs or of defectively constructed chimneys.

Insurance schedules could be readily adjusted to aid very materially and for this action a perfectly good precedent exists in the action taken regarding the little cement storage houses of shoe factories.

Accidents due to these were negligible but the potential hazard was recognized as severe and a regulation was adopted requiring (1) that a certain distance be maintained between these cement houses and the factories *unless the cement houses were of fireproof construction;* (2) placing a high insurance rate upon the cement houses and requiring them to be specifically insured and not included with other property.

Action of that sort would probably go further toward eradicating the wooden ash barrel or garbage house than any other and at the same time avoid a considerable fire loss by removing the cause. Such a regulation would be entirely in keeping with the customary application of "defect" penalties and deal with a much more important matter than many of the "defects" now considered necessary to notice.

The Call to the Colors

Issued by Central Safety Committee, P. & L. E. R. R.

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Organization to Prevent Accidents

By J. C. Smith

Director, Department of Safety and Sanitation Relief, Inland Steel Company, Indiana Harbor, Ind.

An Address Before the East Chicago Local Council of the National Safety Council.

IN this age of highly developed organizations it seems superfluous to attempt to explain the advantages of a system as opposed to no system. This reminds me of a story which I believe well illustrates the point:

Pat was employed by a subway construction company. As he was leaving the house his wife said: "Do moind yez don't git hurt, Pat, it's so dangerous working in that subway. "That's all right, Biddy," Pat replied, "I borrowed two dollars from the foreman and he won't let me do dangerous work any more."

If all foremen would take such a personal interest in looking after the safety of their men as Pat's did for him, I am sure accidents in America would be greatly reduced.

Statistics showing that systematic accident prevention methods have resulted in reduction of accidents from 20 to 75 per cent in various industries prove that safety organizations pay huge dividends in lives and limbs as well as in economic results.

There is not, and never has been, any propaganda more deserving of the support of all mankind than the safety movement. It stands for the conservation of human life and limb, and answers that eternal question, "Am I my brother's keeper?" in a most positive manner.

J. C. SMITH

Though written of in the laws of humanity toward brethren in Deuteronomy 22d, wherein it is provided, "When thou buildest a house then thou shall make a battlement for the roof, that thou bring not blood upon thy house if any man fall from thence," it is only during the last 30 years that there has been an organized safety movement, and the growth has been most rapid in the last five years.

ORGANIZATIONS

R. J. Young of the Illinois Steel Company estimates the value of various branches of safety work as follows:

Organization	45%
Attitude of officers	20%
Safety committees	20%
Inspection (workmen)	5%
Education	30%
Instruction of men	15%
Prizes	9%
Posting signs	3%
Lectures	3%
Safeguarding	25%
Safety devices	17%
Lighting	5%
Cleanliness	3%

The first step to take in the organization of a safety department is the appointment of a safety director, with a suitable staff to handle the work connected with the department and to de-

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fine the scope of the department. Experienced safety engineers believe that greatest efficiency may be attained by centralizing the following branches of work under this department, and this is especially true in plants employing fewer than 1,500 men.

1. Employment: Selection of employes and general labor problems.
2. Medical and Hospital: First aid; stretcher stations; emergency hospital; base hospital.
3. Accident Prevention: General supervision, organization, etc.; guarding, standardization, lighting, inspection, educational.
4. Compensation Matters: Adjustment all claims; reports of accidents; appearances before Industrial Commission.
5. Fire Department: Prevention; inspection, installation devices; fire fighting.
6. Police Department: Inspection; guarding plant.
7. Sanitation: Plant cleanliness; plant beautification; litter boxes; sewage disposal; drinking water; toilets; ventilation; locker rooms; washhouses.
8. Welfare Activities: Lunch rooms; commissaries; visiting nurse; laundries; relief funds; insurance; pension plans; milk supplies; housing; gardens; picnics; vacation camps; profit sharing; bonus plans; Christmas parties; Y. M. C. A.; club houses; savings and investments.
9. Educational Activities: Apprentices; corporation schools; correspondence courses; Americanization; plant publications.

You will readily see that there is a great deal to this work, and you will find as you go along that each of the various phases of the different activities is so closely correlated that it will pay to have one department in charge of this work. However, every safety director has many problems, and unless he has the moral support of the management his work will never attain the greatest possible success. Therefore, it has been found advisable to have a central safety committee which will be associated with the safety director in an advisory capacity. The committee should have as its chairman the assistant general superintendent of the works, and at least two other men, preferably heads of departments, who have the proper interest in this work. The committee should meet at least once each week in the office of the safety department, and should inspect the works at least once a month, or oftener if possible.

A safety committee should also be appointed in each department by the superintendent of the department, with the approval of the safety director. It should be a permanent committee, composed of the best available men in each natural division on both turns of the department. The number of men on the committee will vary with the size of the department.

The duty of the safety committees is to make regular inspections of the department at least once each week; to take notes of defects in machinery, buildings, method of working or handling material, or any condition throughout the works which may be the cause of accidents to employes. They should also see that all new employes are properly instructed concerning the duties of their work. Each committee shall be allowed the necessary time to make a thorough inspection of its department at least once each week, and after each inspection the committee should make a written report, covering such matters as in its opinion call for attention, with recommendations concerning the same. The committee shall also investigate all accidents causing a loss of time occurring in the department and file a written report.

It is a good idea to have a representative of the safety department accompany each committee on its inspection trip.

At the Indiana Harbor Works the safety committees make about 200 recommendations each month, practically all of which are approved and installed.

It is advisable to hold meetings of the committees in the department superintendent's office once each month, and the department superintendent should act as chairman.

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All of the chairmen of the several committees should meet in the office of the safety director at least once each month. The members of the central safety committee should be present, and the assistant general superintendent should act as chairman of the meeting.

A banquet should be arranged at least twice each year in the church parlors of the city, at which all safety committee members should be present. The general superintendent should preside, and a program to stimulate enthusiasm should be arranged.

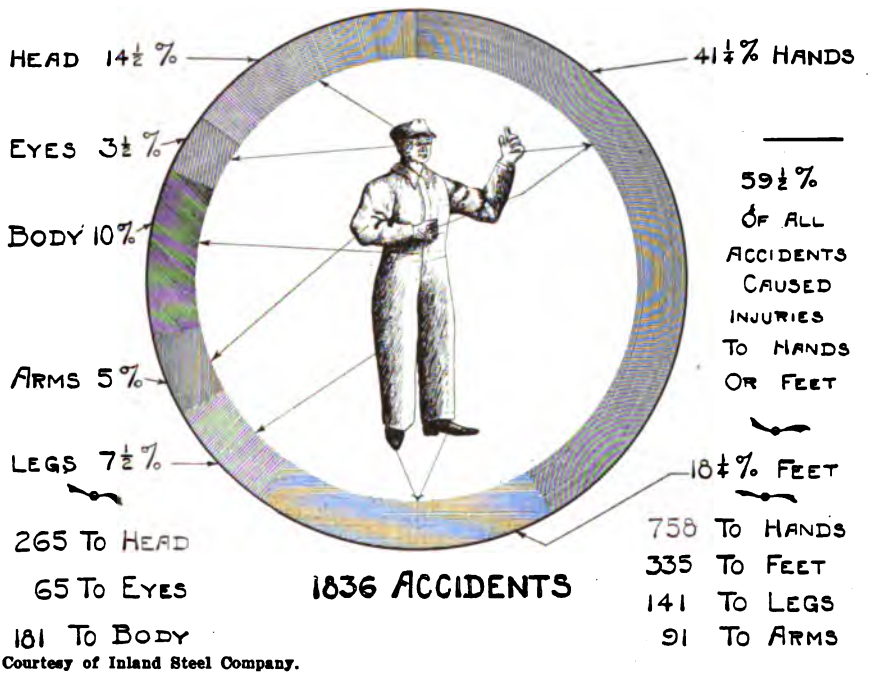
Each member of the safety committee should be provided with a button or badge.

This comprises the organization necessary to carry on practical accident prevention activities.

SAFETY DEPARTMENT ORGANIZATION

The safety department will naturally divide itself into two branches—office and plant.

In order to intelligently provide means to prevent accidents, it is necessary to learn how accidents occur. This laboratory method demands a surgeon's report to be turned in to the safety department covering each accident treated at the emergency hospital. This report is entered in the register at the safety department. Each case is given a case number at the hospital, and this number is placed on all papers relating to that case. These papers are appended to a legal back. Books of "Foremen's Accident Reports," with instructions as to use, should be distributed about the works so that each foreman receives a copy.



Causes of Accidents at Indiana Harbor Works

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Whenever an accident occurs he should fill out his report and hand it in at his superintendent's office. The superintendent should countersign it and send it to the safety department. In case of a serious accident, a report should be made by telephone and an immediate thorough investigation made.

The register is kept by departments, each month separately, and contains a brief history of all accidents and classifications thereof. It forms a general reference book for statistical information.

Weekly reports covering the accidents of the previous week are given to each superintendent at the weekly meeting. This report covers detailed information regarding accidents occurring in the several departments, classified according to probable time from duty; the number of uncompleted and completed safety repairs in each department, and a brief synopsis of how the accidents occurred where probable time from duty will be over seven days. An additional report is compiled to show the work of the safety committees, with list of repairs suggested during the week and list of those completed. Appended is also a report of visits made by visiting nurse and hospital treatments. Matters presented in this report and such other matters as the safety director or anyone else wishes to present are discussed at weekly meetings.

A monthly report is furnished to the management giving detailed figures of accidents during the month by departments, classified as to time lost with percentages of accidents to the number of men employed as high and low to the work's average. Settlements, amounts, number of days' time lost, open cases by periods and departments, cost per ton, estimated monthly cost by departments, and settlements for year and comparison of months make up this report. A letter usually accompanies each report to explain and present new recommendations.

A monthly report showing classification of accidents in several various manners showing place where accidents occurred, how they occurred, part of body injured and other valuable information is sent to superintendents each month. The reports show exactly how the accidents occurred and point out how to prevent accidents.

An annual report is sent to the management and gives a complete summary of all of the activities of the department during the year.

You will notice that the office system is to keep records to aid in preventing accidents. The office also handles all compensation claims, reports, etc., and takes care of all letters and reports of inspectors to superintendents.

The inspection of the works is carried on in a systematic and thorough manner. The plant is divided so that each inspector has a division to inspect, and it is his duty to inspect all departments in his division at least twice each week, which he does in company with safety committees. He must also investigate all accidents causing a loss of time and make a written report. He must also file a written report covering each inspection trip to the department superintendent, who has one week to complete the work before a formal order is sent out by the safety director to complete the work. Safety repair orders are written on a special form and mailed to the superintendent of the department concerned. If he will do the work he fills out a detachable form at the bottom of the order and sends it to the safety department, otherwise the order is sent to the mechanical department and a shop order is written out. The shop order number is filled in the form at the bottom of the order, which is detached and mailed to the safety department. The safety department thus receives acknowledgment of the order and is able to follow it up by the shop order number.

Other forms are used to carry on the work of the department and to form permanent records regarding the various businesses transacted.

The office system is so installed that any information is immediately obtainable and to automatically give information as to progress in accident prevention.

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EDUCATION

After the organization is accomplished the most important work to be carried on is of an educational character. This is true of all industries, as at least 90 per cent of all the accidents in practically every industry arise from common causes, and after the plant is put in safe physical condition it will be found that from 95 per cent to 98 per cent of all the accidents are due to failure on the part of the human element.

The table below gives the experience of the Indiana Harbor Works concerning this:

ANALYSIS OF CAUSES OF ACCIDENTS DURING SIX YEARS.

1. Trade risks incidental to the industry	47.50
2. Negligence on the part of company or foreman	1.86
3. Negligence on the part of the injured	44.51
4. Negligence on the part of others	6.13
	100.00

One of the first things to do in starting educational work is to adopt an emblem, or trade mark, as you are about to start an advertising campaign and your emblem is going to signify something real to the men in your employ. The safety emblem of the Inland Steel Company consists of the diamond company trade mark, in which is the name, Inland Steel Company, and below, "Safety Always." Inside of the diamond is a lighthouse, which signifies safety. The emblem should be used on all stationery forms, etc., safety buttons and service medals, prizes, bulletins and in every possible manner.

The safety bulletin board offers great opportunity for reaching the men from an educational viewpoint. The latest type of these boards is of steel construction, with pattern lumber back having room for six National Safety Council bulletins. There is a glass door in front of board and illuminated safety glass sign above. The light also illuminates the board at night. One of these boards should be placed at each plant entrance, and at least one should be placed in each department in a prominent place where it will attract attention. Boards should be placed at a height so bulletins may easily be read. Bulletins from the National Safety Council are carefully prepared, and home made bulletins should also be used. They should be changed in each board at least twice each week.

Courtesy of Inland Steel Company.

First Aid Equipment—Stretcher Station

Illuminated signs at entrance to works form a good medium through which to appeal to the men.

A large sign may be placed at the plant entrance to carry the safety appeal to the men.

Educational safety appeals may be printed on pay envelopes or enclosed inside.

A rule book should be printed as soon as possible in the several languages of the men employed at the plant. The book should be illustrated, and should cover in a comprehensive

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way warnings as to the hazards of the industry. Each man as he is employed should be given a copy of the rule book printed in his language.

It is becoming a rather common practice for employers to publish magazines for distribution among employes. The magazines, when carefully prepared and well illustrated, serve to increase the loyalty and efficiency of the employes to the company as well as to promote safety.

Mass meetings of employes form a fine medium through which to put safety over the top. The plant band should furnish the music, at least twice as many tickets should be issued as there are seats, and an interesting program arranged. We found it best to have one address, then moving picture films, with vaudeville between the reels. The program should start at 7:30 and end at 9:30, although some prefer to have dancing afterward.

Education of employes will be greatly stimulated through offering prizes for suggestions to prevent accidents. Many of the suggestions received will prove valuable. They encourage the men to look for dangerous conditions and practices, and this is really fundamental education.

To encourage the reading of rule books, safety buttons are offered to all employes passing a successful examination of the rules within ten days after being employed, and a safety service medal is given for passing examination of rules and working six months without causing accidents to themselves or others.

Before this plan was introduced it was difficult to get men to read the rule books. Over 6,000 buttons and medals have been given out at Harbor Works.

Safety education may also be accomplished through night schools by lessons relating to accident prevention, and safety pictures may be shown to school children, which takes it into the homes in an effectual manner.

Plant preachers may be engaged to instruct new men in their own language regarding the dangers connected with their work.

Superintendents may hold meetings in their departments and thus educate their men and arouse enthusiasm.

SAFEGUARDING

All safety devices should, so far as possible, be incorporated as an integral part of the machine when it is being constructed. It is quite common now to attach clauses to all orders for new equipment which provide that all dangerous moving parts, such as gears, shafting, etc., shall be safeguarded according to the specifications provided by the company, and to comply with the laws in the State in which said machinery is to be used.

One of the first things to do when starting a safety department is to adopt standard specifications for safety devices to be installed.

I can heartily recommend the book on Universal Safety Standards, and suggest that the chief engineer, master mechanic and boiler shop foreman be provided with copies.

Specifications have also been gotten up by the Inland Steel Company, the Illinois Steel Company and other large companies, and it will probably be necessary for each industry to get up specifications to cover the peculiar hazards of that industry. The pamphlets issued by the National Safety Council on Safe Practices and those issued by the safety committee of the National Association of Manufacturers are very good. The drawing room should check all drawings for safety.

In the task of devising and installing safety devices the practical safety engineer will first study the conditions on the machine to be guarded, so as to familiarize himself with operations of same. Guards should be constructed of wire mesh or expanded metal to permit view of mechanism in operation and provide means for lubrication. In addition to constructing the guard of material heavy enough and strong enough to have a permanent value, another vital point must be considered, and that is delay in removing and replacing the guards.

The inspection service should see that guards are maintained in good re-

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pair and kept in their proper position.

The items coming under safeguarding of a large plant include innumerable hazards, and I will not attempt to treat of them except to say that the object is to provide a safe place for employes to work.

Signs are largely employed to warn of existing dangers which can not be entirely eliminated or guarded against. Porcelain enamel signs with white background and red letters, have been found to be the most efficient kind to use. Many firms are now using the new danger emblem in the corner.

Many safety devices designed to prevent accidents are furnished for the personal use of employes, such as goggles, leggins, gloves, hand leathers, shoes, fireproof clothing, etc. All of these items should be carefully selected, and only goggles having the Underwriters Laboratories' approval should be used.

The works should be inspected regularly at night as to lighting conditions, and good illumination should be provided.

In this paper I will not attempt to go into the other phases of the work mentioned in the forepart of my remarks, except to say that a great deal of attention is being paid to the subject of "Labor Turnover" and its relation to accidents, and it is generally conceded that the selection, instruction and education of employes are a most important factor in accident prevention work.

The safety department must look after the stretcher stations about the works and inspect them regularly, and see that proper first aid and medical treatment are secured in case of accident.

Courtesy of Inland Steel Company.

Inland Steel Company Visiting Nurse Service. Top (left) Tubercular patient. Top (right) Preparing food for tubercular patient. Below (left) Preparing food for baby. Below (right) Instructing mother as to baby care.

This, gentlemen, gives a brief description of the work of preventing accidents. There is a great deal more to it than appears on the surface or is expressed in the popular slogan of "Safety First."

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Who Buys?

Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

THE CHANCE-TAKER IS ALWAYS WITH US!

The General Manager discovers him in a Plant Manager. The Plant Manager discovers him in a Foreman. The Foreman discovers him in a Skilled Workman. The Skilled Workman discovers him in an Unskilled Workman, etc.

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EDITORIAL

THE AUTOMATIC SPRINKLER SITUATION

THE automatic sprinkler situation appears to be rapidly approaching a critical stage. The asking prices for equipments have advanced within four years to a point between 200 per cent and 250 per cent of 1914 prices, an increase which, in general, entirely eliminates the investment feature. A basis for exact determination of the actual advance is difficult to find since but few bids are made under exactly similar conditions as regards number of sprinklers and water supplies; but in one actual case where the conditions were entirely unchanged and the latest contract was an almost verbatim copy of the earlier one except as to price, the 1918 price was 213 per cent of 1914, an increase of 113 per cent.

According to the statements of wholesale dealers in pipe and fittings the price of pipe (steel pipe such as is used in sprinkler work) has advanced approximately 80 per cent; cast iron fittings about 100 per cent, copper and zinc about 80 per cent, the wage scale of the Pipers' Union 20 per cent.

The proportion labor bears in this work is a considerable one and the figures furnished (given by firms of high standing) do not suggest a necessity for anything like an advance of 100 per cent or more to the average purchaser.

The opportunity for "profiteering" is an unusual one because of the extension to many officials, within the four year period, of the power to demand automatic sprinklers and to enforce installations; and since such orders are not qualified by any reference to prices the temptation to "make hay" may be very strong and if, as is highly probable, the United States Government is to take a hand and demand protection of munition plants (i.e. all plants working on United States contracts of all kinds for Government use) the opportunity will be unexampled unless some curb can be applied.

The belief is quite general that there exists some kind of trust or agreement among the sprinkler companies for price fixing and maintainance and that there may be collusive bidding. It may be erroneous as to facts, but the opinion does exist as a general belief.

There is, of course, no proof of this, since the public does not have access to the books of the sprinkler companies; nor is there any method for finding out the facts as regards alleged excessive prices and profits beyond the circumstance that the price advances of materials and labor do not appear to justify the advance in equipment costs.

THE New England Factory Mutuals have sought relief by the simple process of designing an automatic sprinkler, and arranging to have it placed on the market at a reasonable price. The result is likely to be a largely reduced cost by cutting out much of the marketing and overhead expense. The saving may be even greater if profiteering or collusion actually

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exists. The action on their part is a perfectly legitimate one, since the burden of advances was becoming unbearable. Automatic sprinklers are a condition precedent to admission to membership in the factory mutuals, hence the mutual companies are logically bound to afford their members all possible relief.*

The plan seems to be to sell sprinklers to everybody at a lower price than the sprinkler companies, but, should the demand exceed the supply, as no doubt it will, a preference may be given to members of the mutual companies. That is, the mutual orders may be filled first. It is understood that the mutual engineers will make plans for their people and let them buy "A. F. M." heads and do their own piping or get it done by local pipers. It will not be necessary to employ sprinkler companies to "draw plans" and the incidental supervision that sprinkler installations require will be provided by the mutual companies to their members.

It may be that the manufacturers of the new sprinkler head and dry pipe valve may not be able at once to meet in full the great public demand for cheaper sprinklers, but progress may be made toward an era of comparatively moderate sprinkler prices. If sprinklers can be furnished promptly, within a few months, in sufficient quantities to supply a considerable part of the public demand, at prices much below present prices, there would seem to be a wonderful opening for up-to-date insurance offices to acquire large clienteles by furnishing plans free to their customers and telling them where to get sprinklers, which appears to be the manner in which the factory mutuals intend to serve their own members. That may reduce present prices by from 25 per cent to 35 per cent.

CERTAIN it is, however, that if the authority of the general Government is to be exercised in the direction of compulsory sprinklers such action will carry with it a moral obligation of protection from profiteering.

Some time ago, when conditions were far less acute than now, it was

*During the past few years much difficulty has been experienced by members of the Factory Mutual Insurance Companies in purchasing sprinklers and dry pipe valves. This has resulted not only in delay in installing protection, but also in increased cost of equipments. There has now been designed in the Inspection Department a satisfactory sprinkler and dry pipe valve. The patents for these have been sold to the Fire Protection Securities Company, a Massachusetts corporation, located at 30 State Street, Boston, which has reimbursed the Inspection Department for the expenses of development, and has licensed the Kellogg-Mackay Equipment Company, Chicago, Ill., to manufacture and sell these appliances at prices based on cost plus a reasonable profit. The factory has been equipped and it is expected that the sprinkler, which will be known as the A. F. M. Type A., will be available for installation about August 1. In connection with installation work, the Kellogg-Mackay Equipment Company is also planning to establish branch offices in various parts of the country and it will be practicable for our members to either purchase appliances for installation by competent men under approved plans, or make contract for the installation with the Equipment Company or its representatives, as they may prefer. The Equipment Company has already arranged with the G. M. Parks Company, Fitchburg, Mass., to act as the New England agents, and it is expected that arrangements will be made by them with other reputable concerns in this vicinity for additional installation work. This does not in any way change the status of the present approved sprinklers and dry pipe valves, but simply provides a permanent addition to our approved list of fire protection appliances, which devices will always be available for our policyholders.—*Announcement by Boston Manufacturers' Mutual Fire Insurance Company.*

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generally understood that the Department of Justice would make a rigid and sweeping investigation of the automatic sprinkler business, but at present there seems to be no sign that any action of this sort was even begun.

It would seem to be high time for the Government to act. If the present prices represent only a moderate profit, as naturally the sprinkler companies claim, and if the public is officially advised after a real and thorough investigation that such is the fact, a prevailing suspicion will be dissipated. Theoretically the sprinkler companies should welcome and urge such investigation, but, seemingly, they are not clamoring for it. To all appearances they prefer the situation as it exists, for suspicions are no bar to doing business under official compulsion.

For the sake of all concerned the Department of Justice should act in this matter—not by merely summoning a few officials to Washington to tell their stories, but by actual examinations of factories, books, cost records and dividends. If the price-fixing and profiteering accusations are justified, it might be that the Government could at least take control of prices, not only upon compulsory work but upon general service. All the demands or requests of the United States to safeguard the nation against fire should meet with prompt compliance—but with that compliance should go a right to be protected against unwarranted prices. Every one compelled to use automatic sprinklers should be assured of securing them at a reasonable cost and without needless delays—even though the Government be forced to undertake their manufacture to meet emergencies.

THREE years ago SAFETY ENGINEERING warned the manufacturers of automatic sprinklers that they were gravitating, perhaps, toward an arbitrary and dictatorial position that might sooner or later get them into trouble with the American public. It was suggested to them that a wise management in any line of business (particularly a business which, to a considerable extent, is a custodian of human life) is always a management that manifests a purpose to deal squarely with the public in the matter of prices. The manufacturers of automatic sprinklers were asked to perceive that a doubt existed in the public mind whether manufacturers, who had organized themselves into a "manufacturers' association," were offering to the people the benefits of a free and open competition in the sale and installation of very useful devices for the protection of life and property. We were informed that the admonitions of SAFETY ENGINEERING were resented by the sprinkler manufacturers who, after the blind fashion of a conscienceless trust (which we hope the automatic sprinkler industry is not) have since gone along precisely as one would expect a monopoly to proceed—somewhat in a "public be damned" manner.

The time has about arrived, perhaps it is past due, in these war time days, when the automatic sprinkler business should be thoroughly investigated in order "To make the world safe for democracy" in a fire extinguishing way. The factory mutual insurance companies of New England—the first friends, and, until recently, the most steadfast friends, of the sprinkler makers—have taken a step, as patriotic as it is firm, to put an end to price control by the automatic sprinkler old guard. It is now up to the stock fire insurance companies to assume a similar attitude.

Either there is or there is not a free competition in the automatic sprinkler business. If there is not, a change of conditions can be quickly brought about if the stock fire insurance companies will assert themselves, in their own interest and in the interest of their policyholders. Nor should they wait too long before they arouse themselves—for reasons that may occur to them upon reflection.

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Mine Fire at Utah-Apex Mine

By V. S. Rood and J. A. Norden

Manager and Assistant Superintendent, Respectively, of the Utah-Apex Mine, Bingham Canyon, Utah

Proceedings of the American Institute of Mining Engineers, Utah Section

THE general system of workings at the Utah-Apex is similar to that found in many of the western metalliferous mines. There is a vertical 3-compartment shaft extending to the surface, from which the various levels have been driven to the orebodies. The 1,000-ft. (305-m.) level, about ¾ mile long, was driven as a haulage and drain adit.

GEOLOGY

The formation is a flat north-dipping series of alternating limestone and quartzite beds. Extensive north-south faulting and fissuring have taken place, resulting in the formation of large replacement orebodies in the crushed zones in the limestone. The orebodies are irregular in shape and size, but follow closely the trend of the mineralizing fissures. The ore consists of galena, pyrite, sphalerite and small values in silver and gold. Large masses of non-commercial pyrite are frequently found in or adjacent to the orebodies, and more or less pyrite is found for some distance in the walls of the orebodies. Lenticular bodies of a black pyritic shale also occur in the zones where extensive faulting has taken place.

MINING METHODS AND CONDITIONS OF WORKINGS

Geological conditions, mentioned before, have made the ground extremely heavy. In mining above the 1,000-ft. level, square-set and filling methods were used, but not altogether successfully. The crushing of timbers extended even into the filled portions of the stopes. The filling material itself, consisting of limestone, shale, and pyrite, possessed swelling qualities which added to the difficulty of maintaining chutes and manways. The oxidation of the filling absorbed much oxygen and produced considerable heat, making artificial ventilation necessary in the stopes. Plans had been made to adopt the slicing system on these orebodies above the 900-ft. level, but they did not extend far enough in this direction to make the proposed change advisable, and, thereafter, work was devoted solely to following the downward extension of the bodies.

The slicing system was adopted when work was started on the 1,150-ft. (350-m.) level. In this system, raises are driven at short intervals through the ore to the level above and then beginning at the top, horizontal slices, 10 ft. (3 m.) thick, are taken across the body, the roof being allowed to settle as soon as the slice has been completed. The system was successfully applied. The mat of timber and caved material absorbed some oxygen, producing heat, but as it became firmly packed soon after each successive drop, the amount of circulating air through the mat was materially reduced, and ventilation easily maintained by the exhaust air from the drills with compressed air and slight blowing between shafts. The raises through the ore gave little trouble, and it was found to be an easy matter to keep one slice open until the ore had been mined. The saving in timber over former methods was marked; little or no ore was lost through caving, and accidents from falling rock were practically eliminated.

At the point where the orebody was first encountered on the 1,300-ft. level, its width was much less than on the level above. Ore was urgently needed to keep up normal production, and, as the walls looked firm, it was decided to try again the square-set stoping and filling methods. Stoping operations had not proceeded far before it became evident that work had been started on a faulted portion of the orebody. Filling drifts, driven in the walls of the stope, encountered

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other portions. Stoping was carried on, however, with results similar to those obtained in previous work above the 1,000-ft. level. Raises were driven through the ore to the 1,150-ft. level for ventilation. The free circulation of air caused the filling to become hotter than ever before. Temperatures of 98 degrees F. were obtained in the working places where the current of air was good.

these stopes continually broke through to the old stope, exposing the hot filling, which gave off so much heat that the slice had to be abandoned and the next one started. When the stopes were finished, the raise and sub-levels were left open, and a current of hot steamy air continued to pass out onto the 1,150-ft. level. This condition caused no inconvenience or alarm, as all the old stopes

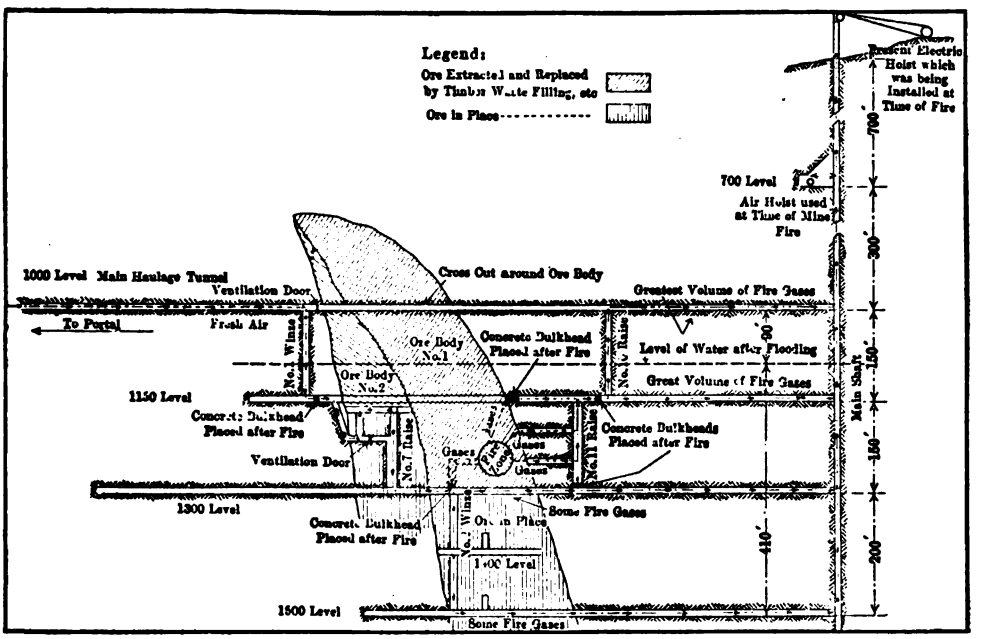

Fig. 1. Cross-section through Workings in Vicinity of Fire Zone

Temperatures in the closely packed fillings were not obtained, but they were probably higher. While this stoping was in progress, it was decided that the other portions of the orebody should be mined by the slicing system. Raises marked No. 7 and No. 11 were then driven between the main levels with sub-levels extending to the orebodies. While this work was under way, the original stope was finished, and the timbers soon crushed so that further inspection was impossible.

Mining went ahead in the new stopes off the raises, under the slicing system, and the block of ore adjacent to No. 11 raise was quickly finished, but not without considerable difficulty. The slices in

gave off more or less steam and foul air. The last work was done at this point late in the fall of 1916, and no further attention was paid to the place. The stopes in the vicinity of No. 7 raise were extended successfully and with little heat, as they were separated from the other stopes by 50 ft. (15 m.) of waste rock. Early in 1917, the orebody was picked up on the 1,500-ft level, and in March raises had been started to block it out for stoping. Ventilation of the lower levels at this time was effected by natural air currents controlled by doors, which were kept closed on the 1,000 and 1,150-ft. levels, causing the current of air to pass to the lower levels, thence up the main shaft to the surface.

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DISCOVERY OF THE FIRE

During the latter part of March, 1917, a strange odor was noticed in the air coming up No. 11 raise. For several days no attention was paid to the matter, and then it was noted that the odor was becoming stronger. This tainted air came up to the 1,000-ft. level through No. 10 raise, then flowed along this level and up the shaft. At this time the main hoisting engine was on the 700-ft. level, and the auxiliary or sinking hoist was on the 1,000-ft. level. The engineers on the hoists, and the station tenders, began to complain that the bad odor was making them sick.

The master mechanic had spent many years in Butte, and from the first he maintained that the mine was on fire. On the afternoon of March 26, the men who had worked in the foul air all day came off shift unmistakably sick, and it was evident that something was seriously wrong. The Yampa, a neighboring mine, had had considerable trouble from a mine fire. The foreman of this mine was taken underground, and he at once expressed the opinion that the mine was on fire.

CONDITIONS DURING THE FIRE

SELECTION OF FIRE-FIGHTING METHODS

The position of the fire zone was known only approximately. It was near the sub-levels, extending from No. 11 raise, in a caved and tightly filled gob, and therefore inaccessible. To reach the fire by attempting to drive through the caved stope might have taken a long time, and the fire would have spread rapidly. It was possible that the fire zone would be so large by that time that one heading would open only a small part of the zone. It seemed unlikely that direct fighting with a hose would be feasible, even if the fire were reached, and there would be a constant risk of life on the part of the men engaged in the work.

Confining the fire zone by placing concrete bulkheads at all openings to the old workings was considered. Such a plan meant turning over to the ravages of fire a space from which 500,000 tons of ore had been mined and in which several million feet of timber had been used. It would have been necessary to abandon about 100,000 tons of reserves. Much exploration work was in progress at that time on the 1,150 and 1,300-ft. levels, and was giving encouraging indications that new orebodies would be found on these levels along the same general ore-bearing channel which contained the old orebody. It seemed probable that the fire would spread throughout this channel in a short time, and make it necessary to confine future operations solely to shaft sinking and exploration below the 1,500-ft. level, a long and expensive undertaking, with assured loss of profit while the work was being done. In this connection, the probable course of the fire was considered. In a fire in a building, the trend is usually upward or following the path of the gases generated; in fires underground, where the exit of gases is confined, the trend is invariably downward or toward the supply of fresh air. Under these conditions, it was by no means improbable that the downward rate of burning would keep pace with stoping operations, or perhaps exceed them, in which case large amounts of ore would have to be abandoned from time to time. Furthermore, a confined fire is a constant menace to the lives of the miners working in other parts of the mine, and there is constant expense for watching, repairing and building new bulkheads. All operations are placed on an uncertain basis, as there is no knowledge of the time or place at which the fire will get beyond the confining bulkheads and cause a complete shut-down.

Confining a fire may be practicable in a mine having many and widely separated orebodies or in places where flooding is impossible, but the ultimate cost of such a method of control or the amount of ore in danger cannot be estimated with any degree of certainty until the system has been tried for several years. In the case of a new fire, it appears that every plan for the extinguishment of the fire should be considered before resorting to confining methods.

Had the fire started above the 1,000-ft. level, or in some other place having no outlet at the top, flooding would probably

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have been out of the question, because an air pocket would have been formed and water prevented from reaching the fire. Had the fire been burning for a considerable time, there would have been the possibility of local air pockets in the edges of the stope. The smoke seemed to be derived entirely from the combustion of wood, which indicated with a fair degree of certainty that the fire was somewhere in the caved timbering and that by prompt flooding it could be extinguished, as the caved stope and filling would permit almost complete saturation.

It seemed certain that flooding would do little damage. The shaft and levels were in hard rock, and the timbered portions of the levels near the orebodies were in good condition. No stoping had been started below the 1,300-ft. level. Above the 1,300-ft. level there were several top-slicing stopes near No. 7 raise.

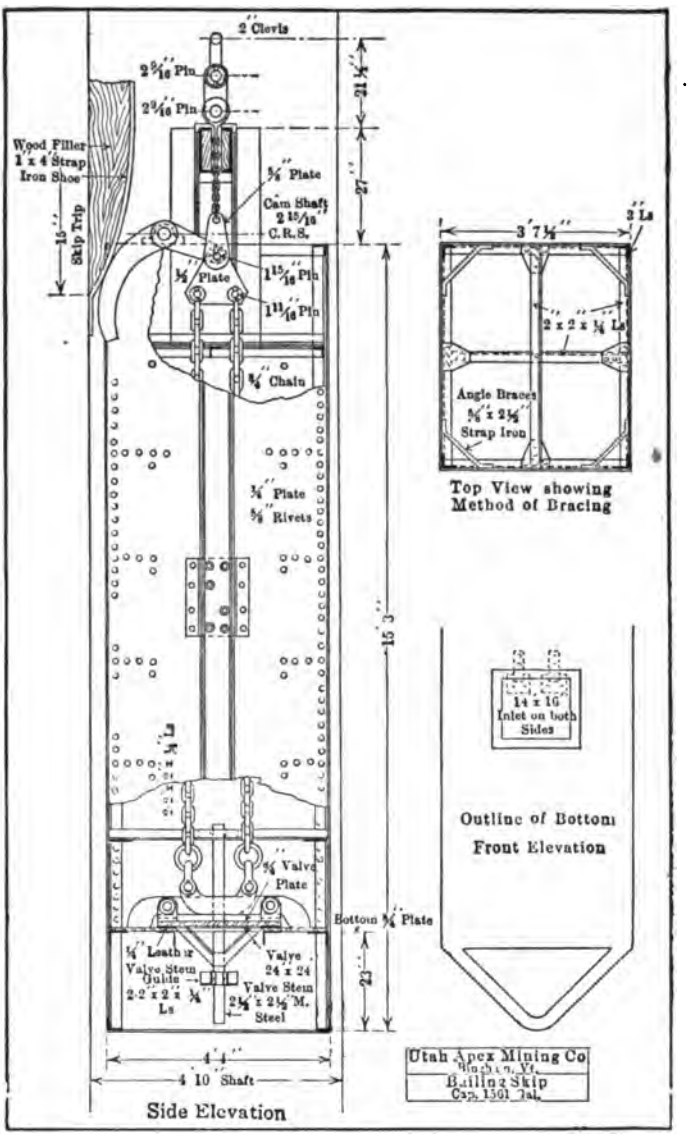

Fig. 2. Bailing Skip

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One slice was open in these stopes, and therefore, at the worst, only this one floor could close up, and all ore remaining upon it could be obtained from the next slice below upon resumption of operations. Main drifts and raises in the orebody were closely lagged, and there appeared little likelihood of serious caving occurring at these points. The workings were lower than those of the neighboring mines and were separated from them by such distances that it appeared certain the mine would be water-tight and that flooding could be accomplished rapidly with the 600 or 700 gal. (2271 or 2649 l.) per minute available. It was estimated that 15,000,000 gal. would be required to fill the mine to the 1,100-ft. level, requiring from two to three weeks. It was believed that if the new hoist which had been installed during the winter were equipped with bailing tanks, it could unwater the mine faster than it had been filled.

Since mining operations had stopped and the workings had been abandoned above the 1,000-ft, level, it had been noticed that the air in these places had rapidly lost its oxygen through oxidation of the pyrite and timber. The heat had also diminished, and samples of air taken in these old slopes by the Bureau of Mines had shown the following composition:

	Sample No. 1, Per Cent.
CO_2	4.11
O	1.68
N	94.21
	Sample No. 2, Per Cent.
CO_2	3.39
O	5.19
N	91.42

This was apparently an inert atmosphere and one in which spontaneous combustion could not occur. If the flooding should be successful in extinguishing the fire, it appeared possible that conditions above the 1,000-ft. level could be duplicated below by sealing off all openings to old workings by concrete bulkheads and driving new ventilating raises at places away from all contact with the old stopes.

Numerous other details were considered, but the above-mentioned reasons were the main ones discussed in conferences with Mr. Shilling, superintendent of the Utah Copper Co., and Mr. Sheehan, superintendent of the Tintic Mining and Development Co. These men recommended flooding the mine, as did also Mr. Pope Yeatman, who had recently examined the mine and was familiar with conditions. On the morning of March 27, 1917, orders were received to flood the mine, and by 5 o'clock in the afternoon all tools, cars, electric locomotives and pumps had been removed from the lower levels.

FLOODING

The main air line was disconnected near the shaft, and the outside end of the line connected with the surface fire pump. As soon as possible, the station pumps which had been removed were also put in operation on the surface, and wherever possible all natural drainage was diverted to the lower levels. On the morning of March 28, the volume of smoke coming up No. 10 raise was so great that it was impossible to go to the shaft. This condition grew rapidly worse, and on April 1 the top of this raise resembled a smokestack, emitting great quantities of dense wood smoke. Some time during the night the water must have reached the fire, for on the following morning the atmosphere in the mine cleared rapidly, and about noon it was possible to go to the shaft and measure the water level for the first time. Pumping was continued steadily, and daily measurements taken until April 10, when the mine had been filled to approximately the 1,100 ft. level.

As soon as the flooding started, a bailing tank was designed and two were ordered. Unwatering was begun on the evening of April 20. The new hoist was used for the first time, and the tanks were discharged at the tunnel level. Two shaft men on each shift, using the sinking hoist and bucket in the end compartment, looked after the tanks, attending to the removal of floating timber and other details.

Good progress was made until the water was lowered to about the top of the 1,300-ft. level station. At this point the tanks rested on the landing chairs

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and would go no deeper. Bailing was continued as carefully as possible, in the hope that, even with partly filled tanks, it might be possible to lower the water sufficiently to enable the shaft men to get chains around the chairs and pull them up, but this could not be done. One of the tanks stuck at the bottom and could not be pulled up. When the shaft men went down to see what had happened,

ITEMIZED ACCOUNT OF EXPENSES INCURRED DURING THE PERIOD OF RECENT MINE FIRE AT THE UTAH-APEX MINE, BINGHAM, UTAH.

March 27 to June 30, 1917.

	Labor	Supplies	Total
Preparing to flood:			
Taking out machinery	$482.38		
Construction of dam and flume	62.63	$4.85	
	545.01	4.85	$549.86
Flooding:			
Direct operating	462.31	238.84	
Watching dam	117.00	0	
Steam power	497.30	344.00	
Electric power	.....	950.54	
Miscellaneous charges	238.50	81.89	
	1,315.11	1,615.27	2,930.38
Preparing to unwater:			
Construction of flume and tunnel under portal of Parvenu tunnel to Bingham Creek	307.57	52.15	
Raising 1,000-level station and installation of ank trips	392.67	84.47	
	700.24	136.62	836.86
Unwatering:			
Auxiliary hoists	725.22	4.05	
Surface hoist (actual tanking)	832.71	331.39	
Electric power	.....	3,791.79	
Steam power	545.85	635.26	
Bailing tanks	364.37	3,308.77	
Direct operating	1,112.94	681.14	
Hazardous work requiring the use of breathing apparatus	1,105.48	647.57	
Repairs to shaft and equipment	827.78	887.30	
Miscellaneous charges	367.50	274.33	
	5,881.85	10,561.60	16,443.45
Preparing to resume mining:			
Cleaning up levels	8,183.71	847.97	
Construction of concrete bulkheads	738.12	200.19	
Surface hoist	91.56	20.56	
Steam power	205.62	239.12	
Electric power	.....	1,000.26	
Replacing and connecting pumps	301.21	95.81	
Miscellaneous charges	186.29	115.28	
	9,706.51	2,519.19	12,225.70
Overhead expenses:			
Supervision	1,361.47		
Timekeeping	356.00		
Barn expense	183.25	140.16	
	1,900.72	140.16	2,040.88
Total fire expense			$35,027.13
Equipment Installed, Value of Which was not Consumed During the Fire:			
3,000 feet of 6-in. pipe line	959.68	4,160.69	
Cement gun	21.94	1,345.51	
Six sets Draeger breathing apparatus	9.00	1,360.07	
	990.62	6,866.27	7,856.89
Total fire and equipment expense			$42,884.02

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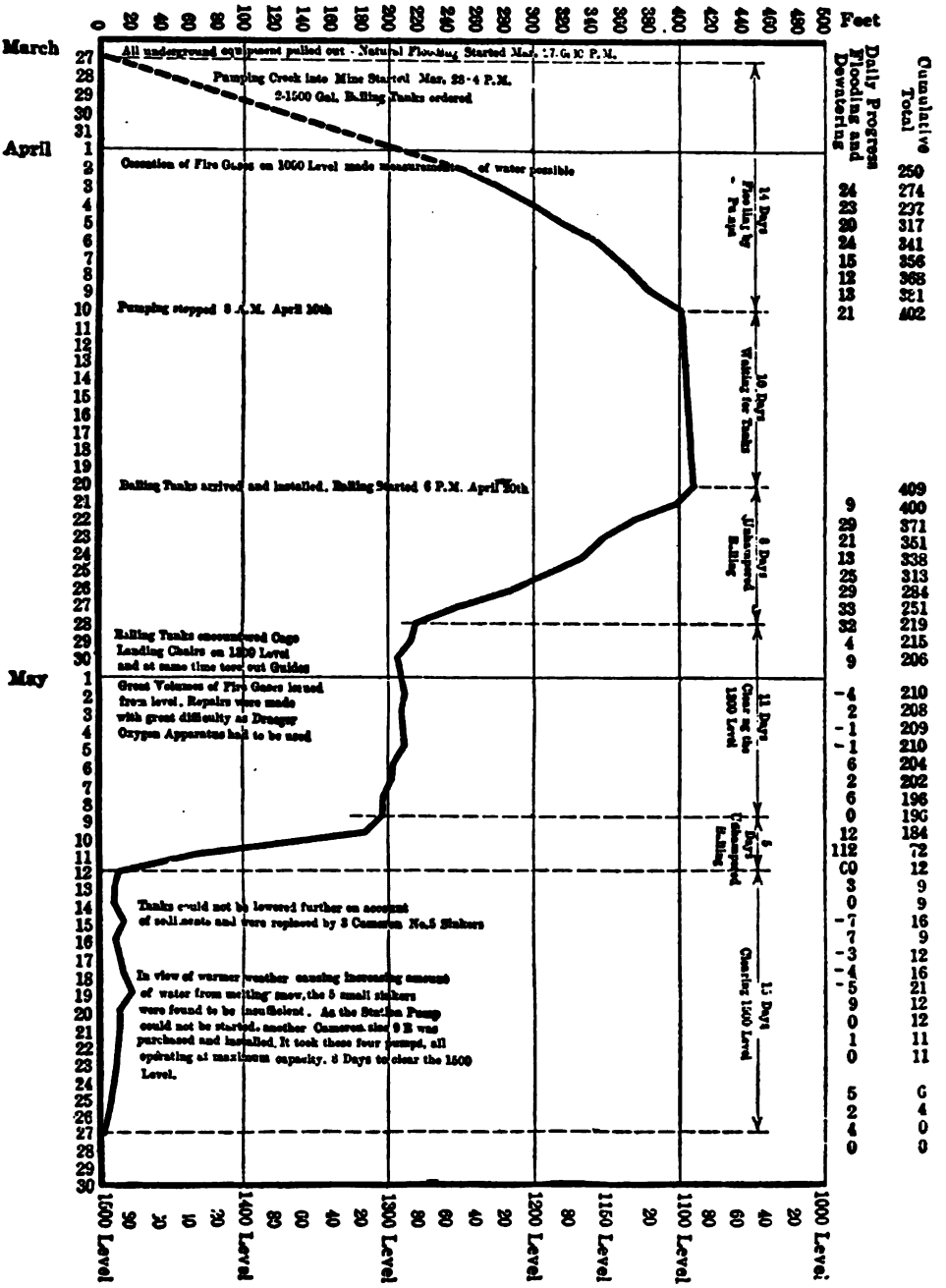
March
April
May
Feet
Daily Progress Flooding and Dewatering
Cumulative Total
All underground equipment pulled out - Natural Flooding Started Mar. 27 6:10 P.M.
Pumping Creek into Mine Started Mar. 28 4 P.M.
2-1500 Gal. Bailing Tanks ordered
Cessation of Fire Gases on 1050 Level made measurements of water possible
14 Days Pumping by Pumps
Pumping stopped 8 A.M. April 10th
10 Days Waiting for Tanks
Bailing Tanks arrived and installed. Bailing Started 6 P.M. April 20th
9 Days Unsuccessful Bailing
Bailing Tanks encountered Cage Landing Chairs on 1200 Level and at same time tore out Guides
Great Volumes of Fire Gases issued from level. Repairs were made with great difficulty as Draeger Oxygen Apparatus had to be used
11 Days Clear the 1200 Level
6 Days Unsuccessful Bailing
Tanks could not be lowered further on account of collapsed and were replaced by 3 Cameron No.5 Stakers
In view of warmer weather causing increasing amount of water from melting snow, the 5 small stakers were found to be insufficient. As the Starlite Pump could not be started, another Cameron size 9 E was purchased and installed. It took these four pumps, all operating at maximum capacity, 8 Days to clear the 1500 Level.
11 Days Clearing 1500 Level
1500 Level
1400 Level
1300 Level
1200 Level
1150 Level
1100 Level
1000 Level

Fig. 3. Mine Flooding and Dewatering

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they were suddenly plunged into a strange gas about 50 ft. (15 m.) above the water. Their lamps were put out, and it was only through the best of fortune that they were able to give the signals to be pulled up. Later, this gas was found to be mostly nitrogen and carbon dioxide, the latter having been formed at the time of the fire and confined in blind headings and stopes beyond the fire zone. Bailing was continued with the other tank; in a few hours this also stuck, but at the 1,150-ft. level, safely out of the water. Air was turned down the regular lines, and the column pipe, but on the following day no change in the level of the gas nor in its strength was noticed. The sinking bucket would bring the gas up just like water, but blowing had no perceptible effect.

On the day the fire was discovered, six sets of Draeger 2-hr. breathing apparatus, and a month's supplies for these sets, had been ordered. This material had arrived on April 20, and a crew was slightly trained in its use. Storage-battery lamps had also been secured. The helmet men did splendid work, considering the difficulties. Guides were torn out continually, and finally one compartment of the shaft was fitted with long pieces of 4 by 6, which extended a short way under the water. These pieces were placed at short intervals all around the compartment, and the tank was fitted in so tightly that it was impossible for it to miss sliding onto the guides when pulled out of the water. It was then possible to drop the tank with sufficient force to give it a pile-driving effect, and the chairs were soon knocked out and fell out of the way. Bailing was continued with this tank, the lining being extended from time to time until the water was several feet below the station. Permanent repairs were then made to the other compartment, and bailing was resumed in it until the water had been lowered far enough to make repairs in the compartment first used.

As soon as the tanks were working smoothly again and the level was cleared of water, the helmet crew was able to walk into the level and open air valves near the stopes. This rapidly drove the gas out of the shaft, where the tanks carried it up into the fresh-air current. In a few days, it was possible to begin cleaning up the level without the use of breathing apparatus. Two helmet men, however, were held in readiness each shift to render aid in case further bad air or gas was encountered by the clean-up gang.

Bailing was rapid between the 1300-ft. and the 1500-ft. levels, and no gas was encountered in opening the latter level. A bulkhead had been left in the shaft, 4 ft. (1.2 m.) below the rails of the 1500-ft. level, as a safeguard against lowering men into the sump during former operations. Several tons of rock and mud had settled on this bulkhead, and the tanks could not lower the water below the 9-ft. mark. Three No. 5 sinkers were started, but made no headway, because much water was still draining from the workings. These were replaced by a No. 9 sinker, and the water was lowered below the level by May 27, exactly 61 days from the time flooding was begun. Had it not been for the delays on the two stations, the flooding and unwatering would have taken only a few days over one month. The accompanying chart shows graphically the progress of this work.

CONDITIONS AFTER THE FIRE

CONDITION OF WORKINGS

As soon as the station pumps were again in place, the tanks were removed and the regular cages placed in service. Cars were sent to all the levels, and cleaning up started. Most of the mud was found on the 1500-ft. level, averaging 1 ft. thick. The greater part of this was a thin slime and was washed out by the pumps. Little mud was found on the other levels. Most of the mud had come from the muddy creek water which was pumped into the mine at the time of flooding. In the neighborhood of the orebodies, the drifts and raises were found practically blocked with fine ore which had run through the cracks in the lagging. The slices in the stopes had practically run full of ore, but the timbering everywhere was in fine condition, and the working places had only to be shoveled out. Four thousand tons of ore, mostly clean-up material, the cost of which was charged to the fire, were

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shipped in June, 9,000 tons in July, and 16,000 tons in August, the latter being the largest tonnage month of the year. The accompanying statement shows in detail the costs of fighting the fire and cleaning up the levels and stopes. It covers a period from March 27 to June 30. Undoubtedly some of the post-fire conditions hampered July operations, but as the tonnage was nearly normal and the work difficult to distribute, no charge was made against the fire in this month.

PREVENTIVE MEASURES

As fast as the levels were cleaned up, concrete bulkheads were placed at all openings leading to the fire zone. In August, samples of the air behind the bulkheads were taken, and showed the following analysis:

1150 Level.	Per Cent.
CO_2	10.00
O	1.70
N	88.00
1300 Level.	**Per Cent.**
CO_2	8.53
O	4.59
N	87.00

Flooding cooled everything to the natural temperature of the water, and there has apparently been no heating behind the bulkheads since they were put in place. New stopes started below the 1300-ft. level since the fire have become warm, but as soon as a stope has been finished all openings will be sealed, and it is thus hoped that future trouble will be avoided.

RECOGNITION OF HELMET CREW'S EXCELLENT WORK

In conclusion, the thanks of the company are extended to Messrs. Shilling and Sheehan for their good counsel and suggestions relative to fire-fighting methods. All the neighboring mines were prompt to offer any aid in their power, and this action was greatly appreciated. To the helmet crew the company is particularly indebted, and has endeavored to express its appreciation in the form of bonuses and better positions. Its thanks are also given to all its employes who through their loyalty and energetic efforts helped very greatly in the time of need.

Safety Work at Mare Island Navy Yard

By Clarence E. Ralston

Safety Engineer

THE safety work at this yard was officially launched with the issuance of commandant's Order No. 337 on November 1, 1917. This comprehensive order brought into being an organization which has been gradually growing and expanding as the workmen of the yard learn the full and true meaning of Safety First.

Prior to November 1, 1917, the safety work had been in charge of a general safety committee, which met once a month, made an inspection of the yard, and had installed such safeguards as it considered necessary and desirable. The committee was composed of supervisors only, the workmen not being represented. The committee was responsible for a number of good guards, but did no educational work among the men. The only educational work undertaken was the installation and maintenance of safety bulletin boards in the shops of the hull division.

The first move made after the reorganizing of the work was the installation of bulletin boards in every shop and the extension of the bulletin service to include all employes. With the bulletin boards were installed safety suggestion boxes, and an earnest effort is being made to get the employes to realize their responsibilities as to eliminating unsafe practices as well as conditions. They are encouraged to make suggestions as to the conditions found by them in any part of the yard, and many valuable suggestions have been submitted. There is a tendency on the part of many employes to refrain from making sug-

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gestions through fear of criticism and resentment from their supervisor. Some supervisors are very loath to accept any suggestions from the men, thus showing that they not only try to place themselves on a higher plane than that of their fellowmen, but that also they fail to grasp the importance and benefits of co-operation and the proper development of their working forces. In addition to the bulletin boards maintained in the yard one is maintained in the Labor Temple, Vallejo, Cal., where it is doing good work by carrying the safety message to many who would not otherwise be reached. The daily papers of Vallejo have been giving excellent support to the work by opening their columns to all safety articles, notices and reports.

Another part of the educational work, and one in which the men are much interested, is the illustrated safety lectures. These have been given weekly, and sometimes there have been two and three in one week. After the first lecture, which was given in one of the largest halls in the city of Vallejo, the Trades and Labor Council requested a series of lectures covering each trade represented. This enabled the safety engineer to get in close touch with each group of men and also gave them a chance to get acquainted with him. Many of the lectures lasted more than two hours, yet very few men left until the last picture was shown, and much real good has resulted from the work. This is shown clearly in the report for the first 3 months of 1918, which indicates a 33 per cent. reduction in injuries over the last 6 months of 1917.

When a man is injured he is instructed to leave his work at once and have his injuries dressed at the yard dispensary. The men are encouraged to procure proper medical care for all injuries, no matter how minor or trivial they may appear to be. This has been the means of greatly reducing the number of infections formerly found among the men, and has helped to maintain the full strength working force. If the nature of the injury is such that he cannot work, a man is sent to the Vallejo General Hospital under the care of the naval surgeon, and kept there until able to resume work or until all possible danger of serious complications is past. This part of the work is also a development of the new organizations, as the former practice was to give the injured man emergency treatment and then send him ashore to place his case in the hands of his own physician. A standard naval hospital ambulance has been provided for the exclusive use of civilian employes, and this, with the separate wards in the Vallejo General Hospital, will be a big factor in providing the best of care and attention for those who may be injured. The ambulance is located in the geographic center of the yard and is called direct, from the nearest telephone, to where a man may be injured. Arrangements have been made to provide emergency service on the civil ferry from Mare Island to Vallejo whenever it is necessary to send an ambulance case to the Vallejo General Hospital at times other than regular ferry trips. This also includes the returning of the ambulance to the yard from the hospital in order to keep it available at all times.

Safety devices and guards are being installed in all shops, and unsafe conditions are being eliminated as fast as possible. The only restriction placed on such installations is that they shall not interfere with the much needed production of war work, except in cases of extreme danger. The general condition of the entire yard, from the viewpoint of safety, is good, and it is the intention to make Mare Island Navy Yard lead all others in the great work of accident prevention.

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Safety News and Comment

1918 *Safety Congress*

IT will be held in St. Louis during the week of October 14. Headquarters will be at the Hotel Statler. The city of St. Louis will welcome the members and guests of the National Safety Council and an enjoyable and profitable visit is assured. The congress this year will be bigger, busier and better than ever.

Automobile Fire Apparatus

THE N. F. P. A. specifications for automobile fire apparatus, prepared by the committee on that subject, George W. Booth, chairman, have been adopted by the Construction Division of the War Department and by the Bureau of Yards and Docks of the Navy Department.

War Industries Board

THE Fire Prevention Section of the War Industries Board has moved its headquarters to the War Industries Board Annex Building, 18th and C Streets, Washington, D. C.

Ohio Fire Prevention Congress

ONE of the most remarkable and unique fire prevention meetings ever held in this country was the Patriotic Fire Prevention Congress in Memorial Hall, Columbus, Ohio, June 11 to 14. The congress was held by the Industrial Commission of Ohio with State Fire Marshal T. A. Fleming co-operating.

The purpose of the congress was to awaken the public and industrial fire conscience of Ohio, the importance of this being emphasized as a vital necessity during the war. More than 400 delegates, from every section of Ohio and from cities as far East as Boston and as far West as Seattle, attended the congress.

Department of Public Safety, Syracuse.

A Sane Fourth of July will enable you to count them all on July 5. Your patriotism can best be shown by loaning your money to Uncle Sam! BUY WAR STAMPS!

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The delegates represented every important business organization in the State of Ohio, such as the chambers of commerce, builders' exchanges, engineers, architects, retail merchants, credit men, industrial concerns, fire chiefs, manufacturers and the Ohio Federation of Labor.

From the point of view of unity and co-ordination of effort the Ohio Patriotic Fire Prevention Congress was a united drive against the hazards of fire. In fact, Ohio is the first State to make such a drive.

Delegates who attended the various conferences were unanimous in their praise of the congress as being the best series of educational meetings on fire prevention they ever attended. Much praise was given the Industrial Commission of Ohio and the department of the Ohio State fire marshal for their joint efforts to make the congress a success. In particular, praise was given to Victor T. Noonan, director of safety for the Industrial Commission of Ohio, who had active charge of the congress, and under whose supervision it was planned.

Fire prevention is one of the most important activities of the safety department of the Industrial Commission of Ohio, and Mr. Noonan rightly claims that fire prevention is an important part of the conservation of life and limb. He expresses the opinion that while most people appreciate the meaning of the movement to conserve life and limb at least 75 per cent of the people have no conception of the importance of fire prevention during the war.

Learn the English Language

THE Council of National Defense, Washington, announces that twenty States have formed State Americanization committees or have designated some special agencies to carry out the Americanization program of the Immigrant Education Division of the Bureau of Education of the Department of the Interior, and of the Bureau of Naturalization of the Department of Labor. Considerations of national safety for the future, so far as the loyalty of the population is concerned, require that the English language shall be universal under the American flag. The foreign-born population which has been slow, if not reluctant, to learn the English language and to speak it, must be made to understand that America will no longer be a hospitable place for foreign-language people.

U. S. Demands Railroad Safety

THE United States Railroad Administration has organized a general safety committee. The advisory committee, appointed by Hiram W. Belnap, manager of the safety section of the Division of Transportation, is as follows:

Isaiah Hale, A. T. & S. F. Railway System.
J. T. Broderick, B. & O. Railroad.
R. C. Richards, C. & N. W. Railway.
E. M. Switzer, C. B. & Q. Railroad.
M. A. Dow, N. Y. Central Lines.
C H. Blakemore, N. & W. Railway.
R. H. Newbern, Pennsylvania System.

1918 *Flag Day Was Notable*

THE observation of patriotic holidays by industrial establishments is an excellent method for Americanization. A Flag Day program, observed in many industrial plants on June 14, was suggested by the Bureau of Education, Department of the Interior, Washington. Committees of employers and employes, with foreign-born men represented on the committees, were appointed to arrange the details as follows:

1. Bugle Call. Rally to Flag Staff.
2. Flag Raising. As Flag rose, the "Star Spangled Banner" was sung either as a solo or in unison.
3. Salute to the Flag. Given either as song, chant, or spoken words: "I pledge allegiance to my Flag and to the Republic for which it stands. One Nation indivisible with Liberty and Justice for all."
4. American's Creed. (Repeated in unison.) "I believe in the United States of America as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign Nation of many sovereign States; a perfect Union, one and inseparable, established upon these principles of freedom, equality, justice and humanity for

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which American patriots sacrificed their lives and fortunes. I therefore believe it is my duty to my country to love it; to support its Constitution; to obey its laws; to respect its flag, and to defend it against all enemies."

5. Address by Four-Minute Men.
6. Song. "America."

The Man and The Lathe

EDGAR A. GUEST is the gifted author of the excellent poem, "The Man and the Lathe." As Mr. Guest says, "Let's keep the faith and not forget."

THE MAN:

I am standing at my lathe all day
And this is what I hear it say:
"The best of you, the best of me
Are needed now across the sea;
We do not hear the cannons roar,
No aeroplanes came sailing o'er
Our heads, and yet from day to day
We, too, are soldiers in the fray."

THE LATHE:

"Oh, hand that guides me now be true,
A mighty task is mine to do.
'Tis mine to shape and cut the steel,
I'm building for that better day
With every turning of my wheel
When tyranny shall pass away.
Speed up—Speed up—This thing I make
May save a thousand lives at stake."

THE MAN:

I whisper to my lathe: "Be strong,
We toil to-day to right a wrong.
Some of us march to fife and drum,
My music is your busy hum
And this the hymn you sing to me
Always: 'My Country, 'Tis of Thee.'
This very day, this very hour,
We'll serve the flag with all our power.

"Oh, lathe of mine, across the sea
They need the work of you and me.
They will be fine if you be true.
They'll hold the line if we but do
This task that now to us is set,
Let's keep the faith and not forget.
Speed up—Speed up—Across the sea,
Our soldiers wait on you and me."

Dangers of Highway Advertisements

AS one travels around the country the increasing number of advertising signs along the highways is noticeable, particularly at road intersections. These signs are an increasing element of danger to the traveling public, the *Concrete Highway Magazine* remarks, and steps should be taken to regulate their construction.

If not desirous of prohibiting their construction, the law should demand that they be built with sufficient vision beneath the sign so that any vehicle approaching from the side road can be easily observed.

One disappointing feature of highway advertising is that many of these signs belong to automobile and accessories concerns which unknowingly are endangering the lives of the people. Most, if not all, of these concerns would co-operate with county highway departments if their attention were called to the danger they create.

Student Classes at Museum

A number of study classes have recently gone to the Museum of Safety in New York City for instruction in accident prevention and practical demonstration of safety appliances. Among the classes were groups from the Fidelity & Casualty Insurance Company, a class of students in industrial hygiene from the College of the City of New York, another from the Teachers' College, one from the Sheffield Scientific School of Yale University. The last mentioned group was addressed by the museum's director on the subject of the present demand and opportunities in industry for technically trained safety engineers.

Starts Foundry Course

IN order to insure itself of a supply of trained foundrymen for responsible positions, the Westinghouse Electric & Manufacturing Company recently established a course in foundry work for its employes, between the ages of 17 and 21, who have completed at least the eighth grade of the public school or its equivalent. The course includes the following: Bench and floor molding; machine molding; coremaking; tempering of sand; cupola operation; mixing of alloys and cost calculating. Instructions are to be given in blue print reading, mechanical drawing, shop problems and metallurgy.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 354 MINE SAFETY.—Accident prevention depends, it seems to me, on the foreman more than on any one else. The foreman is with the men all the time and unless he believes in safety, thinks safety, and watches his men carefully, no matter what the men higher up say or do, accidents will rise; at least they will not fall.

In our organization we have safety meetings at all the mines each month. No definite time is set for the meetings, except that the meetings are held on a night that is suitable to the men. The superintendent is in charge of the meeting and the safety inspector, usually, is in attendance. We try to have present motormen, brakemen, inspectors (shot firemen), assistant foremen, tipple boss and foreman.

All dangerous practices that have occurred in the last month are taken up and discussed, and the means of preventing them are considered. At one meeting that I attended, the question was asked, "What is an accident?" The opinion was that there are no accidents. All accidents are preventable. Men, methods or material are to blame.

The minutes of the meetings are forwarded to the general manager and at the central safety meeting, held monthly, they are discussed. The central safety committee is composed of superintendents, safety engineer, general manager, general superintendent, chief coal inspector and the chief engineer and mine inspector.

We look on the foreman as the man to accomplish safety with the help of the superintendent, who is in the mine usually twice a week. The mine inspector is a great help, as he makes an inspection, once a month, of each mine, while the safety inspector is supposed to be "on the job" all the time.

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No. 355 VARIOUS INDUSTRIES — DANGEROUS AND UNSAFE PRACTICES. — *Boards with Nail Points:* Instruct the men not to throw or allow lumber to lie around with nail points sticking up. Throw old lumber on scrap piles or extract or bend the nails down, so that no one may get his feet punctured, as an injury from a nail might result in blood poison or death. The same applies to pieces of scrap or slivers which might cause an injury.

Wearing of Loose Clothing: Employes working around engines, moving or revolving machinery, shafting, etc., should not wear loose or unbuttoned jackets, blouses, shirts, torn clothing, long neckties, gauntlet gloves, etc., as there is a possibility of the men being drawn into the moving parts which may cause them to lose their limbs or life. Encourage the men to wear overall jackets tucked into trousers or under overall bib, and discourage the practice of wearing loose clothing. Gloves without the long wrist extension are more safe than the gauntlet gloves, especially while working around moving machinery.

Stumbling Hazards: Pile material neatly, not too high, and avoid obstruction of passageways. Loose material overhead and under foot, projecting nails, sharp and ragged edges, improper piling and storing of materials, and poor maintenance conditions in general may directly cause a casualty. Remove the stumbling hazards and minimize the number of accidents.

If proper attention is given to the elimination of these sources of danger many accidents may be prevented.

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No. 356 VARIOUS INDUSTRIES — AT THE CROSS-ROADS. — The title, "At the Cross-Roads," may appear somewhat removed from the subject of safety, but as a matter of fact there is a connection, certain and definite.

THEN

There are few men, in no matter what branch of endeavor they be engaged, who at some time during their careers have not had a "farm" experience; and such of us as have enjoyed the wholesomeness of "nature life," even though only as boys, recall with pleasure the days when we were compelled (by reason of lack of conveyance) to walk three or four miles to the postoffice and "village store"; and we remember how on our first trip, we came to the "cross-roads" (unmarked); how we became confused and undecided as to which road to pursue. Our mental powers were drafted into action and, after pondering and calculating, we chose the road that appeared to be the right one, all directions considered. We realized, at the time, that a wrong selection would result in unnecessary travel and fatigue.

NOW AND THE FUTURE

Today, as men, we are far removed from pastures, brooks and shady lanes. We are individual gears, each one meshing with the next and so on, the entire connection forming one gigantic, human, power unit. Each individual should ponder and calculate not as to the right road to the "general store" but what path to follow that will lead to the desired point, or accomplish the desired point, without exposure to an unnecessary hazard.

Notwithstanding the vast amount of printed matter that has been circulated relating to safe practices, notwithstanding safety organizations, councils, etc. (each of these factors straining every point to educate the industrial and commercial masses regarding the elimination of unsafe practices), it remains a fact that thousands upon thousands of workers arrive at the "cross-roads," where safe and unsafe courses of action meet, and neglect to consider which road leads to a safe and happy return to the waiting family at home, or to the operating table, to suffering and perhaps to death.

In the main, manufacturers have learned that the highest plant efficiency cannot be attained unless safe working conditions are maintained, and to that end they have expended enormous sums of money for the installation of safety devices, but when these devices have been installed, of what value are they when the employe neglects to apply the device?

The writer is of the belief that there is no greater neglect than that practised by the abrasive wheel operator, who fails to wear at all times, while using the wheel, the goggles provided by the employer. The claim is often made by the operator that the glasses steam, preventing a clear vision of the work in hand. Assuming that to be a fact, in all cases, there remains but little if any excuse for placing the goggles to one side, when it requires but a few seconds to remove, dry and replace them.

It has been said that a majority of all accidents are due to carelessness. That is, indeed, true, but when the word carelessness is used, the term thoughtlessness should not be overlooked, for each word means about the same thing when applied to accidental injuries. To reduce the percentage of accidental injuries, the thoughtlessness item is the paramount consideration. The working class must be educated, individually and collectively, and that can be accomplished, effectually, by shop meetings, held at noon, with men as speakers who have a straight from the shoulder, forceful argument. Failing to think ahead must be dwelt upon with no little emphasis.

Safety engineers and inspectors are individuals upon whose shoulders rests a considerable part of the burden of directing the factory worker in the right direction. These safety men should exert every possible effort toward improving their own safety education in order that they may be in a position to impart, in a clear and well

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outlined manner, the advice or information they may have to present.

It is not necessary that an engineer or inspector be an orator. In fact straight-line oratory is not desirable. Factory workers do not want to listen to "Bryan" talks. They want to listen, and, as a rule, they will devour every sentence, when the talk follows a line which "digs" down beneath the skin, and opens up a new line of thought. We must lead by education. That represents an immense field of activity for the man who is in a position to present to others the material he has gathered, in a manner that will hold the strict attention of his audience.

War conditions will draw many men from our industrial plants, and women will be placed at work in rapidly increasing numbers. New conditions surrounding these female workers, also their lack of familiarity with industrial plant conditions, may result in an increase of the accident rate, although it is claimed that women workers, taken as a whole, are superior to male workers as regards forethought, and forethought is the foundation of safety. Therefore, cultivation of "thinking ahead" should be the standard of every human being. Once this important factor is uppermost in the mind, at all times, accidents will show a marked decrease—the one common target we are all firing at with a very good percentage of "hits."

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No. 357 ALL INDUSTRIES. — YOUR OWN LITTLE SAFETY MEETINGS.—Every time you hear of an accident what do you think? How did it happen? How could it have been avoided? Do you ever hold little personal safety meetings with yourself during the day, when the time drags, and you are talking, perhaps, about things that do you no good, and maybe harm? Do you ever stop to realize how much good you could do by having these little safety discussions, not only for yourself, but for your fellow-workers? Often you have seen someone doing something foolish, like picking at the ear with a sharp-pointed instrument. This practice alone has caused many serious operations to be performed. If the person is near you tell him about it. It not, be sure that he learns of it in some way. This is the way to start your little safety discussions. There are many things done every day which, if you are on the lookout, you will notice to be unsafe. Perhaps you, yourself, are careless in many ways and people may tell you so. It will do you no harm if they do.

Why not hold these little safety meetings every day, at lunch time or during the odd moments? Compare notes with your fellow-workers and, by these little discussions, help the work along. A large proportion of all accidents are due to carelessness on the part of the injured person. There is no safety device invented that can be applied to the careless man to make him safe. He must be taught to take care of himself. Just try this, and see if you can't make a careful man of the careless man.

Thousands of men are being killed and injured daily in the great world war. The industrial workers of the world are slowly but surely diminishing. Women, whose places are in the homes, are taking men's places in the factories and shops. Every man is needed. It is up to us to help our country, and ourselves, by doing all we can toward the prevention of accidents.

Comments by Members of the Committee

I have selected No. 351 as my first choice of the articles, May number, under the heading, The Man on the Job. My reason is that this article seems to contain the highest number of original and useful ideas—ideas that have not heretofore appeared in print. However, I must take exception to one paragraph in which the author lays less stress on getting the "man at the top" interested in reducing accidents than his chief assistants. The work will not go if the "big boss" is less interested in it than the others.

No. 352 is another good article. I am not going to criticise anything said in it, but I am going to refer to an experience within my own observation that is not entirely in harmony with what the author says with regard to the greater importance of educational work

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among employes than mechanical safeguarding, for prevention of accidents. In a new mill where I am entirely familiar with conditions, more attention was given to making situations fool-proof than was given in any other mill ever erected. The accident hazard is much lower than in any other mill I have any knowledge of. When reviewing the plans of this mill as they were prepared by the engineering department, one matter was discussed where, by a big additional outlay, the situation could have been made safer but the question of economy had the greatest weight in deciding the matter. About 50 per cent. of the very serious accidents that have occurred in this mill since it was put into operation, and during the erection of the buildings to their present state of completion, have occurred at the situation mentioned. In another situation that was discussed there was an apparent hazard, but, as the construction shown in the plans was one generally adopted in other plants, where it gave satisfaction, it was decided to install it until shown that it could be improved upon. The only fatality that has occurred in the mill referred to was through the objectionable feature that was discussed, which has since been removed and a more fool-proof arrangement substituted.

In the case alluded to, the advantages of mechanical safeguarding over educational method seem to be more than 50 per cent.

I select 352. I find in that article very useful suggestions not only for organizing the heads of the different departments, but also for taking the workmen into your confidence and letting them understand that they are to be just as interested in the ways of safety as the foremen. It would be a good idea to have a safety banner presented by the safety committee at the end of each month to the department which has the fewest accidents. The safety committee should explain to the workmen why this honor banner is presented to them, and urge them to hold on to it as long as they can so as to create a competition with the other departments.

My vote goes to the author of 352. The safety man who gets results is the one who keeps hammering away along that line all the time. Through the foreman is one of the very best ways of reaching the workmen and a foreman keenly interested in safety work is a great force in the prevention of accidents. The methods suggested in the article for keeping the foreman interested are all very good.

In condensed form, but with detail enough to make himself well understood, the author of 352 covers the essential points necessary for the inauguration and development of an efficient safety organization.

I cast my vote for 353. The author states: "It pays to advertise safety." Also that the best life insurance is "Safety First." That means that the requisites are carefulness, watchfulness and thoughtfulness. That is true, and his scheme of trying out "Safety First," "Clean-up" and "Sanitation" weeks is a good idea. It should create enthusiasm among the workmen, and enthusiasm is a dominant factor in safety work. We should follow some of the schemes of the leading advertisers in our work, as no doubt it will be a paying proposition in the reduction of accidents.

Prizes for May Articles

First Prize. No. 352. Harold T. Martin, Head of Health Department, Fisk Rubber Company, Chicopee Falls, Mass.

Second Prize. No. 350. Charles Tribe, Manager, Milwaukee Optical Manufacturing Company, Milwaukee, Wis.

Other meritorious articles were contributed by J. W. Conway, Safety Inspector, Pittsburgh Steel Products Company, Monessen, Pa., and H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

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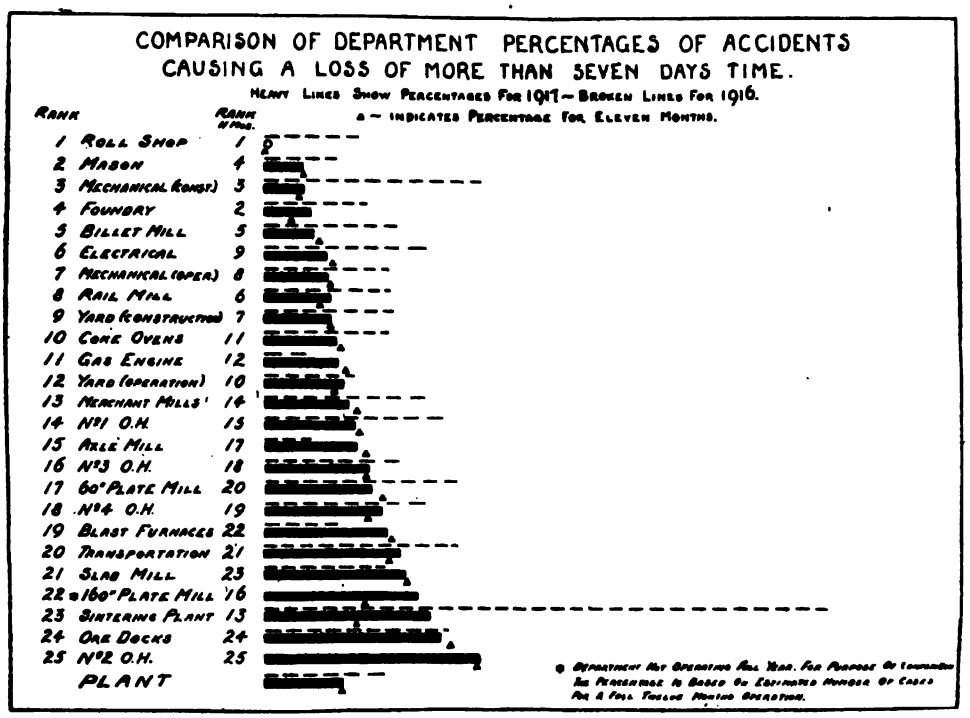
Accidents in Steel Making


COMPARISON OF DEPARTMENT PERCENTAGES OF ACCIDENTS
CAUSING A LOSS OF MORE THAN SEVEN DAYS TIME.
HEAVY LINES SHOW PERCENTAGES FOR 1917 — BROKEN LINES FOR 1916.
▲ — INDICATES PERCENTAGE FOR ELEVEN MONTHS.
RANK
RANK 1ST MO.
1 ROLL SHOP 1
2 MASON 4
3 MECHANICAL (CONST.) 3
4 FOUNDRY 2
5 BILLET MILL 5
6 ELECTRICAL 9
7 MECHANICAL (OPER.) 8
8 RAIL MILL 6
9 YARD (CONSTRUCTION) 7
10 COKE OVENS 11
11 GAS ENGINE 12
12 YARD (OPERATION) 10
13 MERCHANT MILLS' 14
14 Nº1 O.H. 15
15 ALLE MILL 17
16 Nº3 O.H. 18
17 60" PLATE MILL 20
18 Nº4 O.H. 19
19 BLAST FURNACES 22
20 TRANSPORTATION 21
21 SLAB MILL 23
22 160" PLATE MILL 16
23 SINTERING PLANT 13
24 ORE DOCKS 24
25 Nº2 O.H. 25
PLANT

Gary Works, Illinois Steel Company.

Facts About Daily Perils

STRIFE is civil as well as military. Industry, battling for a livelihood, suffers losses comparable to those of war. In the year 1918, 2,000,000 wage-earners in this country will suffer serious injuries, and about 35,000 will be killed. Metal mining ranks highest in the list of killed and wounded. Next comes coal mining, then the occupations of the sailor and fisherman, and after them, in point of hazard, railroading. The lowest risk is that of the farmer. The commercial traveler is next to the lowest. Much of his time is spent on the railway, but a first-class passenger train is one of the safest places in the world. The average person is much safer on a journey in a parlor car than he would be at home. In homes people suffer many disabling accidents. They tumble downstairs, fall off stepladders, smash their fingers with a hammer, etc. On the train, sitting still in one place, the whole organizaiton of the railroad is looking out for one's safety.

Of 1,000 average disabling accidents 7 will happen to clergymen, 9 to physicians, 8 to lawyers, 3 to grocers and provision dealers, 4 to undertakers, 2 to photographers, 3 to hotel clerks, 5 to plumbers, 53 to carpenters, 15 to blacksmiths, 6 to policemen, 30 to firemen, 42 to railroad employes, 1 to an actor and 1 to a cook. So says a statistician of the United Gas Improvement Company.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

CEMENT, TILE AND OTHER KILN INDUSTRIES

February 13, 1918. Akron, Ohio. Cooper Brick Co. Spicer and South streets. Paving brick. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown but believed to be tramps smoking. Fire started in shed. About 10 p. m. Alarm, box. Duration, 2 hours. Fire was favored by all frame construction. Firemen handicapped by frozen mains; nearest hydrant that could be used was 1,500 feet from fire. Private fire apparatus, none. Value of building and contents, $11,500. Property loss, $9,548.

April 10, 1918. Toledo, Ohio. Toledo Mantel & Tile Company. 237 Superior street. Mantel sales rooms. One 3-story building partly destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by watchman about 5:26 a. m. Alarm, private watch system. Duration, 1 hour. Stopped in building of origin. Fire was favored by wood construction. Private fire apparatus, none. Means of escape, ordinary exits. Value of building and contents, $70,000. Property loss, $15,000.

April 26, 1918. Yorktown, Ind. Skillen-Goodin Glass Factory. South of East Mill street. Glass house. One 1-story building partly destroyed. Walls, sheet iron and wood. Floors, cement. Roofs, paper and tar. Cause, unknown. Fire started in paper in packing room. Discovered by watchman about 5:15 a. m. Alarm, factory whistle. Duration, 1 hour. Stopped in building of origin. Firemen handicapped by lack of water and factory hose being in bad condition. Private fire apparatus, pyrene and hose. Persons in building, 6. Value of building and contents, $50,000. Property loss, $17,000, approximately.

CHURCHES

April 5, 1918. Prophetstown, Ill. First Congregational Church. Corner Park avenue and Jackson street. One 1-story building destroyed. Walls, concrete and rock foundation, frame building. Floors, wood. Roofs, wood. Cause, overheated furnace. Fire started in basement. Discovered by adjoining property owners about 12:45 p. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Fire was favored by frame construction. Private fire apparatus, none. Means of escape, 3 double outer doors. Value of building and contents, $16,000. Property loss, total.

CONFLAGRATIONS

March 14, 1918. Middlefield, Ohio. Main street. Drug store; feedstore; manufacturers of maple syrup. Three 2-story buildings partly destroyed. Walls, stone. Floors, wood. Roofs, tin and slate. Cause, overheated stove. Discovered by occupant of building about 11 p. m. Duration, 4 hours. Stopped in feed store. No fire department. Private fire apparatus, none. Means of escape, ordinary exits. Value of buildings and contents, $50,000. Property loss, $20,000. Records and valuable papers protected in safes.

DEPARTMENT STORES

March 27, 1918. Thompsontown, Pa. C. D. Stewart, and others. Corner North Mill and Pine streets. Department store, stables and garages. Six 2½-story buildings destroyed. Walls, wood, brick and stone. Floors, wood and concrete. Roofs, tin. Fire started in Stewart's store about 1:30 p. m. Duration, 4 hours. Stopped at the 5th house. Firemen handicapped by insufficient equipment of volunteer company. Private fire apparatus, none. Persons in buildings, 4. Injured, 2. Means of escape, outside fire escape. Value of buildings and contents, $150,000. Property loss, not reported. Valuable papers and records protected in safe.

DWELLINGS, ORDINARY, CITY

February 22, 1918. Hornell, N. Y. W. T. Macelwee. M. E. Church. 110-112 East avenue. Dwelling and church. Two buildings destroyed. Church, 1½ stories high; residence, 2½. Walls, church, frame, with 4-in brick veneer; residence, frame. Floors, wood joisted. Roofs, church, slate; residence, shingle. Cause, overheated stove in residence. Fire started rear, ground floor.

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Discovered by patrolman about 4 a. m. Alarm, street box. Duration, 3 hours. Stopped at church. Fire was favored by frame construction. Firemen handicapped by frozen hydrant. Private fire apparatus, none. Value of buildings, $23,000; contents, $5,000. Property loss, not reported.

March 14, 1918. Greenfield, Tenn. Dwellings and churches. Eleven dwellings, three churches destroyed. Cause, carelessness in people cleaning garden. Fire started about 2 p. m. Fire was favored by wooden construction of all buildings. No fire fighting apparatus; blaze carried by high winds. Value of buildings and contents: churches, $4,000; dwellings, $20,000. Property loss, not reported.

April 14, 1918. Weymouth, Mass. E. C. Lloyd; E. F. Marqued. 30 Fairmount avenue. One 2½-story dwelling partly destroyed. Walls, lath and plaster. Floors, wood. Roofs, wood. Cause, explosion, gasoline vapor. Fire started in cellar about 7 p. m. Alarm, telephone. Duration, ½ hour. Stopped at kitchen. Persons in building, 3. Killed, 2. Means of escape, ordinary exits. Value of building and contents, $5,000. Property loss, $2,000.

April 28, 1918. Prudence Park, R. I. Five 1½-story dwellings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause burning brush. Fire started in the woods about 2:30 p. m. Duration, 6 hours. No fire department. Value of buildings and contents, $25,000. Property loss, $15,000.

April 28, 1918. Boston, Mass. R. F. Haffenreffer. Mt. Valley Road, Brookline. One 3-story dwelling partly destroyed. Walls, wood. Floors, wood. Roofs, wood and slate. Cause, unknown. Fire started in bathroom on 2d floor. Discovered by owner about 4 a. m. Alarm, telephone. Duration, 3 hours. Stopped at ceiling on 1st floor. Fire was favored by construction. Firemen handicapped by poor water pressure. Private fire apparatus, extinguishers. Means of escape, ordinary exits. Value of building and contents, $50,000. Property loss, not reported.

DWELLINGS, ORDINARY, COUNTRY

April 10, 1918. Greenwich, Conn. E. W. Russell. North street. Farm cottage. One 2-story dwelling partly destroyed. Walls, stone. Floors, wood. Roofs, wood. Cause, unknown. Fire started on first floor. Discovered by neighbors about 12:40 a. m. Alarm, telephone. Duration, 1 hour. Stopped in building of origin. Firemen handicapped by fire having gained considerable headway before discovered. Private fire apparatus, hose. Persons in building, 2. Means of escape, ordinary exits. Value of building, $10,000. Contents not reported. Property loss, not reported.

April 12, 1918. Wyndemere, N. D. Mrs. E. L. Seaton. Farm dwelling four and one-half miles outside city. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, oil stove. Fire started in kitchen. Discovered by owner about 9:30 p. m. Duration, 1 hour. Stopped in building of origin. No fire department. Private fire apparatus, none. Persons in building, 5. Killed, 4. Means of escape, ordinary exits. Value of building and contents, $500. Property loss, $200.

ELECTRIC TRACTION PROPERTIES

April 7, 1918. Somerville, Mass. Clarendon Hill car barns of Boston Elevated Railway. Broadway, Clarendon Hill. Car house. One 1-story and basement building partly destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, probably from burning grass. Fire started in extreme rear. Discovered by employes about 6:30 p. m. Alarm, private box. Duration, 30 minutes, but streams were played on ruins for 12 hours. Fire was favored by oil soaked floors and old building. Private fire apparatus, private hose lines, which were of no use, as building collapsed in 12 minutes. Means of escape, whole front of building open. Value of building and contents, $250,000. Property loss, total. Valuable papers and records saved.

FERTILIZER AND ACID PLANTS

March 31, 1918. Philadelphia, Pa. General Manufacturing Company. Greenwich Pier and Bigler street. Fertilizer. Three buildings, 1, 2 and 3 stories in height, destroyed. Walls, brick, stone, frame. Floors, wood. Roofs, pitch and tin. Fire started on pier, river end. Discovered by employe about 8 a. m. Alarm, telephone. Duration, 6 hours. Stopped when entirely destroyed. Means of escape, fire escapes and ordinary exits. Value of buildings and contents and property loss, not reported.

FLOUR AND CEREAL MILLS

April 1, 1918. Waldron, Mich. Avis Flour Milling Company. Main street. Grist mill and electric light plant. Seven 1, 2 and 3-story buildings destroyed. Walls, wood. Floors, wood, Roofs, composition. Cause, unknown, but believed to be incendiary. Fire started in grist mill. Discovered by passerby about 11 p. m. Alarm, fire bell. Fire was favored by construction. Value of buildings and contents, $15,000. Property loss, $5,000. All valuable papers and records were saved.

April 15, 1918. Cheney, Wash. F. M. Martin Grain & Milling Co. Railroad and D streets. Flour, grain and milling. Two buildings destroyed; one 1-story, and one 3-story. Walls, frame. Floors, frame. Roofs, fireproofing on frame. Cause, unknown. Fire started at elevator. Discovered by employes about 10:15 a. m. Alarm,

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telephone. Duration, 2 days. Stopped after frame of building was destroyed. Fire was favored by elevator shaft reaching from top to bottom. Firemen handicapped by fire having got too much headway before discovery. Private fire apparatus, four lines of 2-inch pipe and hose. Persons in building, 4. Value of buildings and contents, $175,000. Property loss, $150,000.

FOUNDRIES AND MACHINE SHOPS

March 26, 1918. Milwaukee, Wis. Lindemann & Hoverson Stove Works. Cleveland street and Second avenue. Stove factory. One 3-story building partly destroyed. Walls, brick. Floors, concrete. Roofs, composition. Cause, explosion of enameling oven. Fire started on third floor. Discovered by employe about 3:30 a. m. Alarm, box. Duration, 1 hour. Stopped on third floor. Fire was retarded by construction. Private fire apparatus, pumps. Persons in building, 4. Killed, 1. Injured, 2. Means of escape, outside stairway. Value of building and contents, $1,325,000. Property loss, $16,000.

March 30, 1918. Akron, Ohio. Adamson Machine Company. 730 Carroll street, East Akron. General machine and foundry work. One 2-story building partly destroyed. Walls, brick. Floors, cement. Roofs, steel. Cause, unknown. Fire started in tool and store room on first floor. Discovered by night force in foundry department about 2:47 a. m. Alarm, telephone. Duration, 2 hours. Fire was favored by wooden construction in interior of building. Firemen handicapped by tardy alarm. Private fire apparatus, none. Value of building and contents, $644,000. Property loss, $60,256. All papers and records were protected.

April 4, 1918. Pawtucket, R. I. Narragansett Machine Company. Foot of Vale street. Gymnasium apparatus. One 2-story building, and two sheds destroyed. Walls, wood and brick. Floors, wood. Roofs, shingle and gravel. Cause, unknown. Fire started on first floor of 2-story building. Discovered by watchman about 6:50 p. m. Alarm, box. Duration, 14½ hours. Firemen handicapped by frozen hydrants. Value of building and contents, buildings, $54,000; contents, $155,000. Property loss, buildings, $24,000; contents, $123,000.

April 20, 1918. Stamford, Conn. Stamford Foundry Company. 117-149 Canal street. Stove foundry. One 5-story building totally destroyed; one 3-story building damaged. Walls, wood, sheet iron covered. Floors, wood. Roofs, wood, tin covered. Cause, match or cigarette dropped in excelsior. Fire started at first floor of 5-story building. Discovered by factory officials about 9:30 a. m. Alarm, telegraph through auxiliary system. Duration, 2½ hours. Stopped at adjoining building. Fire was favored by all wood construction, although iron covering was of some assistance in retarding blaze. Private fire apparatus, fire pails and 3-gallon extinguishers. Means of escape, interior stairways. Value of building and contents, $130,000. Property loss, $32,000. Records and valuable papers saved.

April 25, 1918. Perkasie, Pa. Perkasie Forge & Machine Co. 8th and Spruce streets. Forgings. One 1-story building destroyed. Walls, wood. Floors, cement. Roofs, board and paper. Cause, leak in fuel line to furnace. Fire started alongside of furnace. Discovered by employes about 8:30 p. m. Alarm, telephone. Duration, 2½ hours. Stopped when building was consumed. Fire was favored by poor construction. Firemen handicapped by lack of water pressure and delay in turning in alarm. Private fire apparatus, none. Persons in building, 6. Injured, 1. Means of escape, ordinary exits. Value of building and contents, $8,000. Property loss, $7,500. Valuable papers and records carried out.

GARAGES AND AUTO REPAIR SHOPS

February 27, 1918. Philadelphia, Pa. P. Hartney. 1908-10 Morris street. Garage. One building destroyed. Two story, brick. Walls, brick. Floors, wood. Roofs, slag. Fire started on first floor. Discovered by employe about 1:44 a. m. Alarm box in street. Duration, 3 hours. Stopped at roof. Private fire apparatus, chemical extinguishers. Persons in building, 1. Means of escape, several exits. Value of building and contents, not reported. Property loss, not reported.

March 1, 1918. Greensboro, N. C. Coltrane & Dorsett and S. B. Glenn. 109 Lewis street. Garage. One one-story building partly destroyed. Walls, brick. Floors, concrete. Roofs, tin. Cause, unknown. Discovered by passerby about 2:40 a. m. Alarm, by fire alarm system. Duration, 2 hours. Private fire apparatus, none. Value of building and contents, $16,650. Property loss, $7,825.

March 19, 1918. Philadelphia, Pa. L. S. Bowers Motor Company, 245-247 North Broad street. Auto salesroom and repair shop. One 3-story building partly destroyed. Walls, brick. Floors, 1st, concrete base, wood floors. Roofs, tin. Cause, gasoline explosion. Fire started in shop on 3rd floor. Discovered by employe about 3:02 p. m. Alarm, street box. Duration, 3 hours. Stopped in building of origin. Private fire apparatus, portable extinguishers and pyrene. Means of escape, outside fire escapes. Value of building and contents and property loss, not reported to SAFETY ENGINEERING.

GENERAL STORES

February 9, 1918. Navasota, Tex. R. B. Templeman & Sons. North Main street. General store. Three 2-story buildings destroyed. Walls, rock. Floors, wood. Roofs, tin, flat. Cause, unknown. Discovered by night watchman at railroad tower about 1:10 a. m. Alarm, telephone. Duration, 6 hours. Stopped in the same block. Firemen handicapped by high winds. Value of building and contents, $250,000. Records protected.

April 13, 1918. Hampden, Mass. A. G. Corey. Main and Hampden streets. General store and postoffice. Two buildings destroyed. One 2-story; one 2½-story. Walls, plaster. Floors, wood. Roofs, shingle. Cause, unknown. Fire started in cellar of postoffice. Discovered by neighbor about 4 a. m. Dura-

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tion, 2 hours. Private fire apparatus, fire extinguishers and Springfield pump. Persons in building, 8. Value of buildings and contents, $10,000. Property loss, $5,000.

GRAIN ELEVATORS

April 12, 1918. McBain, Mich. Ann Arbor Depot. Grace street. Elevator. Two 2-story buildings and elevator destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in engine room of elevator. Discovered by employes about 2 p. m. Duration, 10 days. Stopped in elevator. Private fire apparatus, chemical extinguishers. Persons in building, 30. Means of escape, outside stairways. Value of buildings and contents and property loss, not reported.

April 27, 1918. Paducah, Ky. Paducah Grain & Elevator Co. 1st and Washington streets. Hay, grain and produce. One 4-story building damaged. Walls, brick. Floors, wood. Roofs, metal. Cause, unknown, but thought to be lightning. Fire started at base of elevator. Discovered by police. Duration, 1¾ hours. Confined to elevator shaft. Fire was retarded by fire doors. Value of building and contents, $200,000. Property loss, $8,000.

HOSPITALS AND SANITARIUMS

April 9, 1918. Frankfort, Ind. Clinton County Infirmary. Burlington avenue and County road. Poor farm. One 3-story, and one 1-story building destroyed. Walls, brick, except kitchen, which was frame. Floors, wood. Roofs, slate. Cause, defective flue. Fire started in attic. Discovered by superintendent about 1:30 p. m. Alarm, telephone. Duration, 3 hours. Firemen handicapped by no water, premises outside city limits. Private fire apparatus, none. Persons in building, 40, all carried out. Value of buildings and contents, $35,000. Property loss, $26,000.

HOTELS AND LODGING HOUSES

April 9, 1918. Des Moines, Ia. Brown Hotel. West Fourth and Chestnut streets. Hotel and apartments. One 9-story building partly destroyed. Walls, brick and cement. Floors, concrete. Roofs, wood, tar and gravel. Cause, defective electric wiring. Fire started on ninth floor. Discovered by employe about 9:30 a. m. Alarm, telephone. Duration, 2 hours. Fire confined to ninth floor and roof. Fire was retarded by construction, fireproof except roof. Private fire apparatus, none. Means of escape, three fire escapes. Value of building and contents, $275,000. Property loss, $35,000. All valuable papers and records protected.

April 16, 1918. Omaha, Neb. Savoy Hotel. 15th and Jackson streets. Hotel. One 4-story building partly destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, carelessness with matches. Fire started in linen closet, fourth floor. Discovered by porter and housekeeper about 10:50 a. m. Alarm, telephone. Duration, 6 hours. Stopped at fourth floor. Fire was favored by old lath and plaster construction. Private fire apparatus, none. Injured, 1. Means of escape, fire escapes. Value of building and contents and property loss, not reported.

INSTITUTIONAL BUILDINGS

April 24, 1918. Rochester, N. Y. Rochester Society for Prevention of Cruelty to Children. 90 Plymouth avenue, north. Shelter for children. One 2-story and attic building partly destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in attic. Discovered by citizen about 8:40 a. m. Alarm, Gamewell system. Duration, ½ hour. Stopped at attic.

IRON AND STEEL MILLS

May 3, 1918. Louisville, Ky. Louisville Steel & Iron Co. Jones and M streets. Rolling mills. One 1-story building destroyed. Walls, corrugated iron and wood. Floors, earth and concrete. Roofs, wood. Cause, unknown. Fire started in oil stock room. Discovered about 8:45 p. m. Alarm, fire box. Duration, 6 hours. Stopped in building of origin. Firemen handicapped by delay in giving alarm. Private fire apparatus, none. Persons in building, night watchman. Means of escape, ordinary exits. Value of building and contents and property loss, not reported to SAFETY ENGINEERING.

MANUFACTORIES, MISCELLANEOUS

February 9, 1918. Cincinnati, Ohio. Cincinnati Advertising Products Co. and others. 1101 York street. Manufacturing and printing. One 3½-story building partly destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, believed to be match igniting excelsior. Fire started in cellar. Discovered by passerby about 3:40 p. m. Alarm, box. Duration, 7 hours. Stopped in building of origin. Value of building and contents, $105,900. Property loss, $40,143.

March 28, 1918. Detroit, Mich. Armstrong & Graham. 128-132 Jefferson avenue, east. Manufacturers of leather goods. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and tar. Cause, incendiary. Fire started south end of building. Discovered by State constabulary after explosion about 7:45 p. m. Alarm, telegraph, box pulled. Duration, 16½ hours. Stopped in building of origin. Firemen handicapped by false alarm which called out all the apparatus in another direction. Private fire apparatus, none. Means of escape, fire escapes and stairways. Value of building and contents and property loss, not reported.

March 29, 1918. Duluth, Minn. Thompson Furniture Company. Herman avenue. Furniture manufacturer. Three 1-story and 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in finishing room. Discovered by citizen about 1:45 a. m. Alarm, telephone. Duration, 3 hours. Fire was favored by wooden construction. Firemen handicapped by lack of water. Private fire apparatus, sprinklers and hose. Persons in building, 35. Means of escape, stairways. Value of buildings and contents, $130,000. Property loss, $67,000. Valuable papers and records protected.

April 6, 1918. Vincennes, Ind. Malberhe-

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Basile Clay Products. Fifth and Willow streets. Manufacturers of fire clay products. Two 1- and 2-story buildings partly destroyed. Walls, frame, metal clad; and brick. Floors, wood. Roofs, iron; composition. Cause, unknown. Fire started in boiler room. Discovered by watchman about 1 a. m. Alarm, regular system. Duration, 8 hours. Stopped at finishing room. Fire was favored by fire door having been left open. Value of buildings and contents, $50,000. Property loss, not reported.

April 23, 1918. Batavia, N. Y. Batavia Specialty Company. 105 Harvester avenue. Manufacturer of tin boxes for drug trade. One 2-story building destroyed. Walls, wood. Floors, wood. Cause, gas stove. Fire started on second floor. Discovered by passersby about 3.40 a. m. Alarm, telephone. Duration, 1 hour. Firemen handicapped by distance from headquarters and tardiness in reporting. Roof had caved in before alarm was given. Value of building and contents, $20,000. Property loss, not reported.

April 25, 1918. Chelsea, Mass. Parsons Box Manufacturing Company. Marginal street. Box manufacturer. Four 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, friction of spark from shaft pulley. Fire started on first floor. Discovered by superintendent about 10 a. m. Alarm, Gamewell system and street box. Duration, 4 hours. Stopped at water's edge. Fire was favored by construction, all buildings being connected. Firemen handicapped by delay in reporting alarm, due to difficulty in opening alarm box door; also by high winds. Private fire apparatus, none. Persons in building, 65. Killed, 1. Means of escape, stairways only. Value of buildings and contents, $75,000, approximately. Property loss, total.

MERCANTILES, MISCELLANEOUS

March 10, 1918. Saskatoon, Sask. J. H. Ashdown. 407 First avenue, north. Wholesale hardware. One 6-story building destroyed. Walls, brick. Floors, mill construction. Roofs, tar and gravel. Cause, unknown. Fire started on second floor about 9:25 a. m. Alarm, May-Oatway signal system. Duration, 105 hours. Stopped at adjoining building. Firemen handicapped by collapse of building a short time after department reached scene, and by lack of water and pumping facilities. Private fire apparatus, none. Injured, 6 firemen. Means of escape, iron fire escapes in rear. Value of building and contents, $355,000. Property loss, $65,000.

March 24, 1918. Warren, Ill. W. E. Stackpole. Main street. Agricultural implements and garage. One 3-story building partly destroyed. Walls, frame, steel clad. Floors, pine. Roofs, frame, steel clad. Cause, unknown. Fire started in basement about 7:30 a. m. Alarm, by regular system. Duration, 3 hours. Stopped in building of origin. Fire was retarded by construction. Firemen handicapped by dense smoke, making it impossible to approach basement. Private fire apparatus, none. Value of building and contents, $65,000. Property loss, $50,000. Valuable papers and records protected by fireproof safe.

March 29, 1918. Cloquet, Minn. 14th street and Cloquet avenue. Retail store. One 2-story building partly destroyed. Walls, wooden. Floors, wooden. Roofs, wood and asbestos roofing. Cause, overheated stove. Fire started in center of first floor. Discovered by passerby about 11:15 p. m. Alarm, telephone. Duration, 8 hours. Stopped in building of origin. Fire was favored by all wood construction. Firemen handicapped by lack of men in department. Private fire apparatus, none. Injured, 2 firemen blown through windows, bruised and burned. Value of building and contents, $50,000, approximately. Property loss, $45,000. Valuable papers and records protected in safe.

April 25, 1918. Eau Claire, Wis. Continental Clothing Store. Barstow and Gibson streets. Clothing store and hotel. One 2- and 3-story building partly destroyed. Walls, brick veneer. Floors, wood. Roofs, tin, pitch and gravel finish. Cause, probably carelessness of smokers. Fire started on first floor. Discovered by neighbor about 5:30 a. m. Alarm, telephone. Duration, 18 hours. Stopped at third floor of hotel. Fire was favored by poor construction and imperfect fire walls. Private fire apparatus, none. Persons in building, 6 or 8. Injured, 3 firemen. Means of escape, fire escape and stairways. Value of building and contents, $140,000. Property loss, $100,000. Valuable papers and records protected.

MERCANTILES, TENANT BUILDINGS

March 19, 1918. Lethbridge, Alta. Acadia block. Third avenue, south. Drug store, dry goods and offices. One 2-story building partly destroyed. Walls, brick. Floors, wood, steel supporting beams. Roofs, wood, tarred over. Cause, not determined. Fire started in basement about 7:20 p. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Fire was favored by construction. Firemen handicapped by dense smoke, making basement practically unapproachable. Private fire apparatus, 1½-inch house connection and hose fittings. Means of escape, back and front doors, and stairway from 2nd floor. Value of building and contents, building, $22,000; contents, $65,000. Property loss, $70,000.

METAL WORKERS

March 16, 1918. Hagerstown, Md. Cumberland Valley Spoke & Bending Company. Highland avenue. Spokes and rims. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started over boiler room in dry kiln. Discovered by passerby about 10:20 p. m. Alarm, telephone and fire alarm system. Duration, 18 hours. Firemen handicapped by failure of fire door to shut, and distance of plugs from building. Private fire apparatus, none. Injured, 1. Means of escape, none. Value of building and contents, $50,000. Property loss, $40,000. Valuable papers and records were saved.

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MISCELLANEOUS

March 22, 1918. Harrisburg, Pa. C. F. Kauffman. 26th and Woodlawn streets. Dentist. One 1-story and one 2-story building destroyed. Walls, wood and stone. Floors, wood. Roofs, slate. Cause, burning rubbish. Fire started in outbuilding. Duration, 1½ hours. Stopped in main building. Private fire apparatus, none.

March 30, 1918. Wilmington, Del. C. B. Loeber & Sons. Jefferson street, between 5th and 6th. Pickling and spices. One 3-story building partly destroyed. Walls, brick and frame. Floors, wood. Roofs, slate and wood. Cause, unknown. Fire discovered by passerby about 3:30 a. m. Alarm, regular system. Duration, 3½ hours. Stopped in building of origin. Value of building and contents, $15,000. Property loss, $12,000.

OIL WORKS AND TANKS

April 15, 1918. Cambridge, Mass. Alden Speare's Sons Company. 156 Sixth street. Oil works. Two 1½-story buildings destroyed. Walls, wood covered with sheet metal. Floors, wood. Roofs, wood and sheet metal. Cause, back fire from auto. Fire started in driveway. Discovered by chauffeur about 12 noon. Alarm, box. Stopped in buildings on each side of driveway. Value of buildings and contents, $53,351. Property loss, $28,610.

PAINT AND VARNISH WORKS

March 30, 1918. Chicago, Ill. Chicago & Northwestern Railroad Yards at Crawford avenue. Paint mill. One 2½-story building partly destroyed. Walls, brick. Floors, wood, cinder and concrete. Roofs, gravel, tar paper. Cause, spontaneous combustion. Fire started on ground floor. Discovered by watchman about 2:30 a. m. Duration, 7½ hours. Fire was retarded by slow-burning qualities of construction. Private fire apparatus, pipe lines on premises. Means of escape, large doors and windows. Value of building and contents, $40,000. Property loss, $25,000.

PRINTERS AND BOOKBINDERS

March 7, 1918. Portland, Me. Portland *Daily Press*. 24 Monument square. Newspaper publishing. One 6-story building destroyed. Walls, brick. Floors, wood. Cause, unknown. Fire started on fourth floor, near elevator. Discovered by man in adjoining building about 6 p. m. Alarm, telephone and bell alarm. Duration, 5¾ hours. Private fire apparatus, 3-gallon chemical tanks.

SCHOOLS AND COLLEGES

March 28, 1918.—Cattaraugus, N. Y. Grade and high school. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate and shingle. Cause, unknown. Fire started on 2d floor. Discovered by passersby about 9 p. m. Alarm, fire whistle. Duration, 3 hours. Fire was favored by inside wood work. Private fire apparatus, none. Means of escape, fire escapes. Value of building and contents, $35,000. Property loss, total. All papers, records and correspondence lost.

April 19, 1918. Louisville, Ky. Sacred Heart Academy. Cherokee drive, between Stiltz and Cannon's lane. Educational academy. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, metal. Cause, tinner's soldering pot. Fire started on roof, at one end, carried by high winds through building. Discovered by employe about 1:48 p. m. Alarm, telephone. Duration, 8½ hours. Fire was favored by open elevator shaft and open corridors. Firemen handicapped by lack of water. Private fire apparatus, 3-gallon extinguishers and 1¼-inch hose on racks. Persons in building, about 125. Means of escape, wooden porch length of building and at rear of each floor. Value of building and contents, $150,000. Total loss.

TEXTILE MILLS

April 16, 1918. Sarnia, Ont. Lindsay, Thompson Flax Company. Flax mill. One 2-story building destroyed. Walls, frame, concrete. Floors, concrete. Cause, spark from smokestack. Fire started in pile of chaff. Discovered by employes about 9:05 a. m. Alarm, telephone. Duration, 3 hours. Stopped in building of origin. Firemen handicapped by distance from hydrant. Private fire apparatus, none. Persons in building, 15. Value of building and contents, $11,000. Property loss, $2,000.

THEATERS AND AMUSEMENT PLACES

May 3, 1918. Three Rivers, Que. Victoria Theater and other buildings. Bonaventure street. Theater. Twenty-three 3-story buildings destroyed. Walls, wood, cement. Floors, wood. Roofs, paper and stone. Cause, unknown. Fire started in theater. Discovered when explosion occurred about 9:20 a. m. Alarm, box telegraph. Duration, 3 hours. Fire was favored by wooden construction. Firemen handicapped by lack of water for an hour, due to accident at water works. Private fire apparatus, none. Value of buildings and contents, $250,000. Property loss, not reported to SAFETY ENGINEERING.

WAREHOUSES, PUBLIC STORES

March 28, 1918. Eastport, Me. Eastern S. S. Company. East side of Sea street. Warehouse. One 1-story building partly destroyed. Walls, iron clad. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in office. Discovered by passerby about 1:15. Duration, under control in half hour. Stopped in building of origin. Fire was retarded by construction. Firemen assisted by American Can Company (salt water). Persons in building, crew working in and about building. Value of building and contents, $50,000. Property loss $20,000.

April 16, 1918. Richmond, Va. T. W. Wood & Sons. 11-17 South 14th street. Seed dealers. One 4-story warehouse partly destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started on 3d floor. Discovered by passersby about 1:15 p. m.

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Alarm, street box. Duration, 1 hour. Stopped after burning 1 floor and part of roof. Fire was retarded by fire doors of adjoining buildings on each side. Private fire apparatus, none. Persons in building, 40. Killed, 1. Means of escape, stairways and fire escapes. Value of building and contents, $350,000. Property loss, not reported.

KILLED AND INJURED IN FIRES

March 10, 1918. Saskatoon, Sask. Wholesale hardware store of J. H. Ashdown. Six firemen slightly injured.

March 16, 1918. Hagerstown, Md. Cumberland Valley Spoke & Bending Co. One person injured.

March 26, 1918. Milwaukee, Wis. Lindemann & Hoverson Stove Works. One person killed, 2 injured.

March 27, 1918. Thompsontown, Pa. C. D. Stewart. Department store. Two persons injured.

March 29, 1918. Cloquet, Minn. Kolseth & Anderson. Retail store. Two firemen bruised and burned.

April 12, 1918. Wyndemere, N. D. Dwelling of Mrs. E. L. Seaton. Four persons killed.

April 14, 1918. Weymouth, Mass. Dwellings of Mrs. E. C. Lloyd and E. F. Marqued. Two lives lost.

April 16, 1918. Richmond, Va. T. W. Wood & Sons. Warehouse. One employe suffocated by smoke.

April 16, 1918. Omaha, Neb. Savoy Hotel. One person injured.

April 25, 1918. Perkasie, Pa. Perkasie Forge & Machine Co. One person injured.

April 25, 1918. Chelsea, Mass. Parsons Box Manufacturing Co. One life lost.

April 25, 1918. Eau Claire, Wis. Continental Clothing store. Three firemen injured.

Carelessness in Pouring Babbitt

THE South Works *Review* of the Illinois Steel Company states that two men were pouring babbitt which exploded and splashed in their faces. Both had their eyes injured because neither was wearing goggles, although one had his in his pocket. When asked by the plant inspector why he did not use his goggles this man naively made answer: "Because they were dirty." Such a rank excuse evoked the query: "Who do you think was going to clean them for you?"

Incidentally he was handed a two weeks' lay-off when discharged from the hospital, just by way of a reminder that it really does not pay to leave off goggles called for by the rules and by common sense. The foreman, in his report, truly said: "The mill machinist should set an example to new men by wearing goggles while pouring babbitt." He was a "dandy" workman on his regular job, so his foreman reported, but when it came to pouring metal he was 100% careless.

What Have You Given Up?

HAVE you given up your job and let your business future take care of itself?

Have you said good-bye to your family and friends and all you hold dear

Have you begun an entirely new career that may end, if you live, with health impaired, an arm off, a leg gone, an eye out?

Have you given up your business future and said good-bye and taken a chance on coming back alive and well, and done it all with a cheerful heart and with a grim determination to do all you possibly can for your country?

And do you only at times—in the evenings, perhaps, when the light in the sky slowly fades away—feel so homesick and so lonesome that you are fearful you will not have the courage to do your part after all?

You have not done these things? Ah, I see, you are not one of our Army or Navy boys; you are a stay-at-home person.

Well, there have to be 20 or more stay-at-home persons for every one who goes, and so certainly no disgrace attaches to being one if you fully appreciate what those boys who do go have to give up and if you support them to the limit of your ability.

Pledge yourself to save to the utmost of your ability and to buy War Savings Stamps that there may be more money, labor, and materials to back up those who fight and die for you.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

SYSTEMATIC INSPECTION OF FIRE EXTINGUISHERS

The Fire Extinguisher Exchange, Cleveland, Ohio, a co-operative organization of manufacturers of two and one-half gallon approved chemical extinguishers, has instituted a supervisory service for the maintenance of fire extinguisher efficiency.

An investigation carried on over a period of years brought to light the fact that, where extinguishers were supposedly being maintained by the owners, the conditions were appalling, due to ignorance, carelessness and neglect, and that where the work of recharging was being done by irresponsible parties, at low prices, it was just as bad, and for these reasons this exchange has undertaken to appoint responsible individuals or concerns in the various cities and towns throughout the country to do this work under definite instruction covering the complete inspection and recharging of the extinguisher with the replacement of any parts worn out or missing.

These representatives enter into a contract with the assured covering a period of years, and after doing the work each year, a definite report of the conditions in which each extinguisher is left is made to the office of the above exchange, and at the end of each month the local insurance and fire authorities and the Underwriters' Laboratories in Chicago are all given detailed reports.

In this way there is no chance of the recharging being forgotten, the work is done properly and the fire and insurance authorities have knowledge of the individual concerns who are making every effort to have their protection in proper shape.

Each year a different colored tag is attached to the extinguisher, where it can be readily seen, and this tag works as follows: If the inspector sees a red tag on an extinguisher during 1918 he knows that that extinguisher was put in proper shape at some time during that year through a service that is approved by the Underwriters' Laboratories. If during 1919 he sees a red tag attached to an extinguisher it immediately calls his attention to the fact that that extinguisher was recharged the previous year, and he should then look at the tag and see the actual date on which the work was done, so that if over a year has elapsed he can call it to the attention of the owner.

The above mentioned company will be pleased to send further particulars regarding this service to anyone requesting it.

MAKES PUSH SWITCH INSTALLATIONS STEAM-TIGHT

Double push button switches, because of their ease of operation, have always been popular, but their use has been restricted by reason of the liability of moisture, gas or dust getting into the operating parts. The Crouse-Hinds Company has designed and placed upon the market a cover with a switch operating mechanism for use with these switches when installed on condulets of either the FS or FD series, which eliminates the objectionable features. This cover is made in one and two-gang forms.

In one of the accompanying illustrations a two-gang cover is shown installed on a condulet, while the other illustration is of a single-

Two-Gang Cover.

gang condulet and cover, with cover unmounted.

Like the condulet, the cover is a casting, either iron or brass, as specified. Iron covers are regularly finished in black enamel, although galvanized finish or any other plated finish will be furnished, if desired. Marine finish is standard for brass covers.

The mechanism which operates the push buttons is under the dome of the cover and is controlled by a shaft, flattened at its inner end and extending through the side of the cover, where it terminates in the operating handle. That portion of the shaft which

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passes through the cover is provided with grooves containing hard grease, which effectually seals the bearing, and a rubber gasket likewise seals the joint between the cover and condulet. "On" and "off" indicators, cast on the ends of the handle, facilitate the operation of the switch.

Single-Gang Cover.

With this cover and the necessary condulet it is now practical to use push switches in places where excessive moisture, explosive or corrosive vapors or fine dust circulate in the atmosphere, as in marine use, ammunition plants, refineries, textile and flour mills and the numberless other locations which readily suggest themselves to the electrician.

Complete description and listings of these covers are given in Condulet Bulletin No. 1000H, which has just been released by the Crouse-Hinds Company. A copy of this bulletin will be sent free to anyone requesting it.

PREVENTING ACCIDENTS FROM OILING MACHINERY

Unquestionably a large number of accidents have been caused in industrial establishments through men climbing on ladders and oiling overhead machinery with hand oiling cans. Such accidents are almost entirely preventable and there is little excuse for such accidents. No employer should permit an employe to risk his limbs or life by this dangerous practice. Many men have been accustomed to this method of oiling machinery, but because they have been fortunate and have not met with an injury, but on the other hand it remains a distinctly dangerous practice and a great number of serious accidents have occurred due to men mounting ladders and reaching up to oil overhead machinery.

Wm. W. Nugent & Co., Chicago, Ill., have for years specialized in designing and manufacturing safety oiling apparatus. This concern has marketed an oiler which entirely removes the oiling hazard. The oiler is operated by the oiler from the floor, and is claimed to save oil and time. By insuring regular oiling it tends to reduce friction loss and thereby being economic in saving power and repair expense. The oiler using this safety oiler can put all his attention on his work, as he is in no danger of injury. Industrial safety officials and employers of industrial labor should provide safety oilers and insist upon their use, for it is only by removing dangerous practices that we can hope to materially reduce the appalling number of fatal and non-fatal industrial accidents.

WASHING FACILITIES IN INDUSTRIAL PLANTS

It is now conceded by those who have given careful attention to the subject that the efficiency of the industrial worker largely depends upon his or her physical and mental condition, and as his or her efficiency directly affects the quantity and quality of his work, the matter comes right down to a dollars and cents basis for the employer.

A man cannot be expected to maintain vigorous health and alert mentality unless the demands of nature are given attention. One of the most important is adequate washing facilities. The work of the industrial worker is such that he or she must be continually coming in contact with dirt, grime, dust, etc., and often in a heated temperature. After working for some hours under such conditions nature demands that the accumulations of impurities be removed from the body. Not only does a good washing in clean water remove the impurities which irritate both physically and mentally, but a refreshing condition is experienced by the tired worker and he can resume his work feeling comfortable and invigorating.

The Standard Sanitary Mfg. Co., Pittsburgh, Pa., supply types of washing facilities for all industrial requirements, and employers who have not yet installed modern sanitary washing facilities should send to the above mentioned company for their book, "Factory Sanitation."

FACTROLITE

As a result of careful study and investigation, it is now generally accepted among industrial safety and efficiency officials that lighting has a most important bearing upon the maintenance of efficiency and the reduction of accidents in industrial establishments. Nothing equals day light, and the more this can be utilized in industrial plants the greater are the advantages secured.

The Mississippi Wire Glass Co., 222 Fifth Avenue, New York City, have recently placed on the market a new glass known as Factrolite, and has been produced especially for use in industrial plants. Factrolite has been scientifically designed so as to produce maximum diffusion and uniform distribution of light for use in industrial or other buildings where daylight lighting is a factor. It has also been proved that employes who are compelled to face the direct rays of the sun are hindered in their work. Factrolite eliminates this objection to a very large extent by breaking up the rays of the sun and diffusing light and distributing it equally. Factrolite can be obtained both plain and wired. The Factrolite wire glass possesses the well-known shockproof and fire-retardant qualities of Mississippi wire glass.

Literature and samples will be sent upon request by addressing the above mentioned manufacturer.

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PROTECTING LINEMEN FROM ELECTRIC SHOCK

Unless properly protected, linemen are subjected to the hazard of electric shock from alternating current, and men who are compelled to work on this current while it is alive subjects them to the dangerous hazard of shock.

The Linemen Protector Co., Penobscot Bldg., Detroit, Mich., after careful study and experiment, placed upon the market what is well known now as the Marshall's Linemen's Shield. A number of improvements have been made in this shield since it was first introduced, and this concern is now supplying a safety device with excellent results. A lineman protected with this shield and Marshall's cross arm shield is effectively protected against the hazard of his occupation. The purpose of the Marshall's Linemen's Shield is to protect linemen while working on high tension lines. It is made of rubber varying in thickness from 3/8-in. where it is subjected to pressure, to 3/16-in. along the flaps. Its shape is such that when the shield is in place no live part of the circuit is within the danger range of the lineman.

This company reports that a large quantity of these shields have been supplied to the Government for use both in this country and abroad.

The importance of protecting linemen's feet from electric shock is recognized by every electrical safety official. Marshall's Linemen's Shoe is made of insulated rubber which gives the linemen on the poles, on the ground and in the man-holes protection against pressure up to 20,000 volts.

Descriptive literature will be gladly sent on request by writing to the above mentioned manufacturer.

PALMER ELECTRIC AND MANUFACTURING COMPANY

The Palmer Electric and Manufacturing Co., Boston, Mass., manufacture a safety switch and cut-out of 250 and 600 volts. These switches comply with all of the requirements of the safety and fire codes.

Some of the features of these switches are:

The cabinet or box is a rigid steel stamping with double strength corners, interchangeable conduit outlets and open wire bushing plates. Conduit or open wire connections may be made without bends to meet the box, which may be mounted in any position.

The switch and cut-out may be readily removed while wires are being pulled in and the arrangement of the terminals permit a neat job of wiring in either a branch, loop or end run connection.

The fuse protects the switch with service wires entering from any direction; the fuses are always dead when the switch is open; a shutter on the box cover permits re-fusing when the switch is open, this shutter locking the switch open when the fuses are exposed, and the switch when closed locks the shutter closed. The shutter may be sealed closed to prevent over-fusing, if desired.

The switch is quick break and cannot be left in a partially closed position; the operating handle clearly indicates whether the switch is open or closed.

The switch may be locked in an open position by the same padlock or seal that secures the main cover.

The above mentioned company will be pleased to mail their catalog to anyone requesting it.

AMERICAN-LA FRANCE FIRE ENGINE COMPANY, INC.

The American-La France Fire Engine Co., Inc., Elmira, N. Y., report that in a recent test of one of their Triple Combination Motor Pumping, Chemical and Hose Cars at Charleston, W. Va., the following results were obtained:

TEST No. 1.

Net pump pressure	119.6
Net nozzle pressure corrected	79.2
Average discharge gallons per minute	809.4
Duration of test	2 hours

This test was made for full displacement.

TEST No. 2.

Net pump pressure	200.4
Net nozzle pressure corrected	60.1
Average discharge gallons per minute	434.
Duration of test	1 hour

The above named company will be pleased to mail a copy of their catalog describing this engine and other fire fighting apparatus which they manufacture to anyone requesting it.

STRONG, KENNARD & NUTT CO.

The Strong, Kennard & Nutt Co., Cleveland, Ohio, are now announcing that they not only supply industrial eye protectors, but have now enlarged their business, which embraces a comprehensive selection of safety and accident prevention devices, first aid safety signs and other requirements needed in modern industrial safety campaigns.

This concern has issued an 82-page illustrated catalog in colors, and a copy will be sent to any industrial safety official who addresses a request to the above mentioned concern.

WESTERN WIRE GLASS

Fire preventionists have long appreciated the value of high quality wire glass as a fire retardant. Experience has proved that wire glass is a thoroughly dependable and reliable means of protecting windows, elevators, sky lights, etc., against the passage of fire.

The Western Glass Co., Streator, Ill., is one of the pioneer manufacturers of this product,

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and has been one of the manufacturers who through years of careful attention to its business has been a factor in bringing wire glass so extensively into use. The products of this concern are well known now and their various brands of wire glass are looked upon favorably by the modern fire protection field.

Sample catalog of the Western Glass products will be sent by communicating with the above mentioned manufacturer.

GIBBS OXYGEN BREATHING APPARATUS

The Mine Safety Appliances Co., Chamber of Commerce Bldg., Pittsburgh, Pa., are now marketing a new oxygen breathing apparatus known as the Gibbs. The manufacturer announces that the Gibbs breathing apparatus is an American development, and has been adopted by the U. S. Bureau of Mines.

Important features of this new self-contained oxygen apparatus are lightness, simplicity and efficiency. Tests prove that in operation the Gibbs gives perfect approximation to normal breathing a valuable development. 285 sets of Gibbs apparatus are now in use in the Government service.

Full particulars of the Gibbs oxygen rescue apparatus can be obtained from the above mentioned manufacturer.

"PIONEER" STEEL SHAFT HANGER

The Standard Pressed Steel Co., Philadelphia, are about to considerably enlarge their facilities because of the continued expansion in their business. It has been found necessary to secure additional quarters at 20th Street and Indiana Avenue, Philadelphia, for their office and business departments, and this they are doing so that they can maintain the prompt and efficient execution of orders for "Pioneer" Steel Shaft Hangers.

This concern for years has been manufacturing the "Pioneer" Steel Shaft Hanger. Steel is by far preferable to iron for hangers because it reduces the danger of breaking hangers to a minimum. Steel withstands violent shock and strain whereas iron is liable to break, and a breaking hanger supporting overhead machinery is liable to cause a dangerous or fatal accident, because the over-head machinery is suddenly released and if workmen should be underneath there is very little time for them to escape.

Industrial safety officials are more and more appreciating the absolute safety which is secured in steel hangers, and where they are not installed the subject should receive prompt consideration. It is only by removing all known opportunities for accidents that accidents can be eliminated, and wherever a condition exists which could cause an accident, that condition should be remedied as far as possible, because an accident has not happened is no justification for permitting an unsafe condition to exist. If an accident can happen from a certain condition there is no telling when it will happen. The safe equipment of industrial plants is one of the most important duties of the safety engineer and no excuse can justify a preventable accident.

The Standard Pressed Steel Co., Philadelphia, will be pleased to furnish full particulars on request concerning the "Pioneer" Steel Shaft Hanger.

PENNSYLVANIA WIRE GLASS

The Pennsylvania Wire Glass Co., Penn. Bldg., Philadelphia, Pa., have specialized for many years in the production of wire glass. The products of this company are favorably known among fire preventionists and many notable installations of Pennsylvania Wire Glass have been made in all types of buildings.

This concern reports that they have a large volume of business on hand and have been one of the leading companies to popularize the use of wire glass throughout the country.

The company invites those interested in the protection afforded by wire glass to send for catalog and full information concerning their products.

PREVENTING ELEVATOR ACCIDENTS

It is estimated that 70% of all elevator accidents are preventable, and a great number of such accidents are charged to carelessness and inexperienced people operating elevators. Unquestionably the large majority of elevator accidents are caused by the elevator being set in motion before the doors are closed. Freight elevator accidents are largely caused by someone starting the elevator from another floor while the elevator is being loaded or unloaded. Both these classes of elevator accidents are preventable by means of the proper safety devices which prevent an elevator being moved until the doors are closed, or in the case of a freight elevator, which prevents anyone from operating the car from another floor.

The Angell Elevator Lock Co., Boston, Mass., have specialized for many years in freight elevator safety devices, and the Angell Floor Stop & Locking Device is now in use in thousands of industrial plants, and is the direct means of preventing freight elevator accidents.

Full particulars of this device can be obtained from the Angell Elevator Lock Co., 370 Atlantic Ave., Boston, Mass.

STEELCRETE MESH

The Consolidated Expanded Metal Companies, Braddock, Pa., manufacture Steelcrete Mesh which is being extensively used for machine and other guards.

Steelcrete is commonly known as expanded metal and has been approved by the Underwriters Laboratories. Steelcrete is made in a number of different meshes to meet various guarding requirements.

Full information concerning Steelcrete can be obtained from the above named manufacturer.

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXV. No. 1 JANUARY, 1918 779550 25 Cents

SAFETY FIRST
ON LAND AND SEA

The Condensite Lens Cups as supplied on the
HARDY WELDING GOGGLE
fitted with special lenses are in use on the ships throughout the United States Navy.

The safety of our "Industrial Forces" is as important as the protection of our sailors and soldiers. Safeguard your workmen's eyes with the

HARDY WELDING GOGGLE
which prevents dangerous welding rays reaching the eyes. Every welder needs them.

Goggles for All Industrial Requirements

F. A. HARDY & COMPANY
JOHN H. HARDIN, President
Chicago: 10 S. Wabash Ave. New York: 29 East 22d St.

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Catch at side prevents switch from being connected until box is closed

"Circle T"

"SAFETY SERVICE"

Knife Switches Externally Operated

FEATURES

1. Box cannot be opened until Switch is disconnected.
2. Switch cannot be connected until box is closed.

Hence it is impossible to come in contact with a live closed switch. Unskilled labor can renew fuses and operate without danger.

BY INVITATION MEMBER OF

The quality of the switch is very important as it receives daily very hard usage. We use our Type "A" switch, the strength of which is unquestioned. The box is of heavy steel and is well finished.

Our "Safety Service" Bulletin shows our complete line. Write for it.

The Trumbull Electric Mfg. Co., Plainville, Conn.

NEW YORK	CHICAGO	PHILADELPHIA	SAN FRANCISCO	BOSTON
114-118 Liberty St.	40 S. Clinton St.	1017-1019-1021 Race St.	595 Mission St.	76-78 Pearl St.

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King's Babbitting Mask

This mask prevented serious injury, and perhaps loss of sight.

They are a necessity around factory cupolas and Blast Furnaces, and wherever the eyes and face are exposed to flying scales or the spattering of molten metal.

Price, $6.00 Each

JULIUS KING OPTICAL COMPANY

NEW YORK
10-12 MAIDEN LANE

CHICAGO
7 WEST MADISON ST.

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PLAYING SAFE

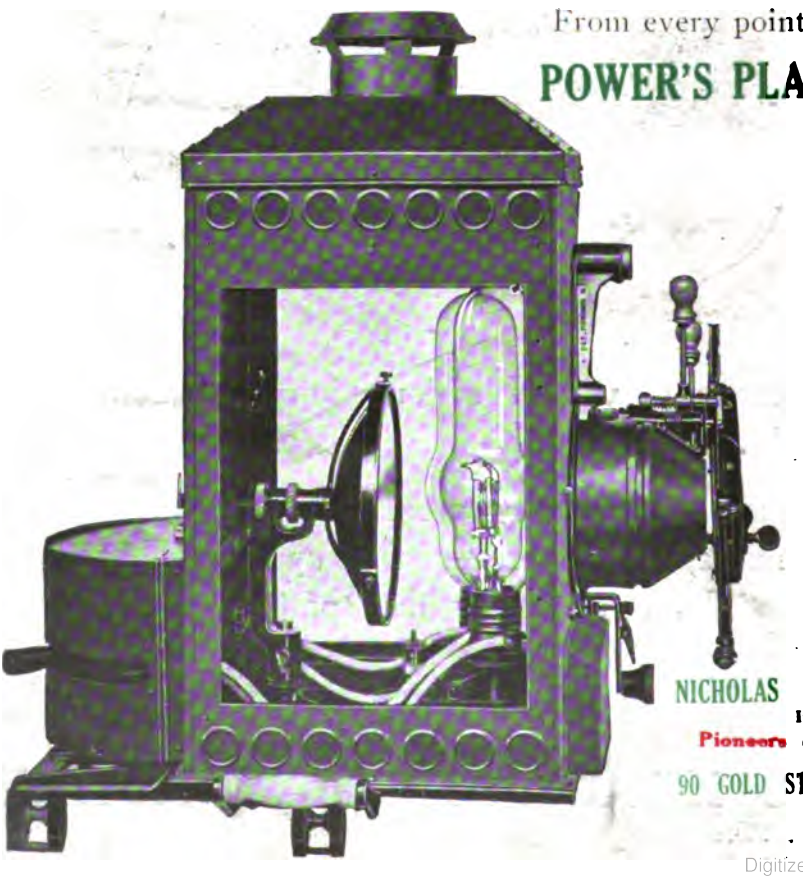
WITH HUMAN LIFE IS MOST VITAL.

THE STRONG POINT WITH

POWER'S CAMERAGRAPH

is "safety first." In its construction great care has been taken to protect it with every safety device known to modern scientific methods.

It has always been known as a "safety machine" and the high quality of its projection has never been excelled.



From every point of view,

POWER'S PLAYS SAFE

NICHOLAS POWER COMPANY
Incorporated
Pioneers of Projection
90 GOLD ST. NEW YORK, N. Y.

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXV. No. 2 FEBRUARY, 1918 25 Cen

SAFE!
THE EYES OF THIS WORKER ARE *SAFE*. HE CAN WELD IN PERFECT CONFIDENCE FOR HIS EYES ARE PROTECTED BY THE
Hardy Welding Goggle
which prevent dangerous welding rays reaching the eyes. Every welder needs them.
Goggles for All Industrial Requirements
F. A. HARDY & COMPANY
JOHN H. HARDIN, President
Chicago: 10 S. Wabash Ave. New York: 15 West 36th St.

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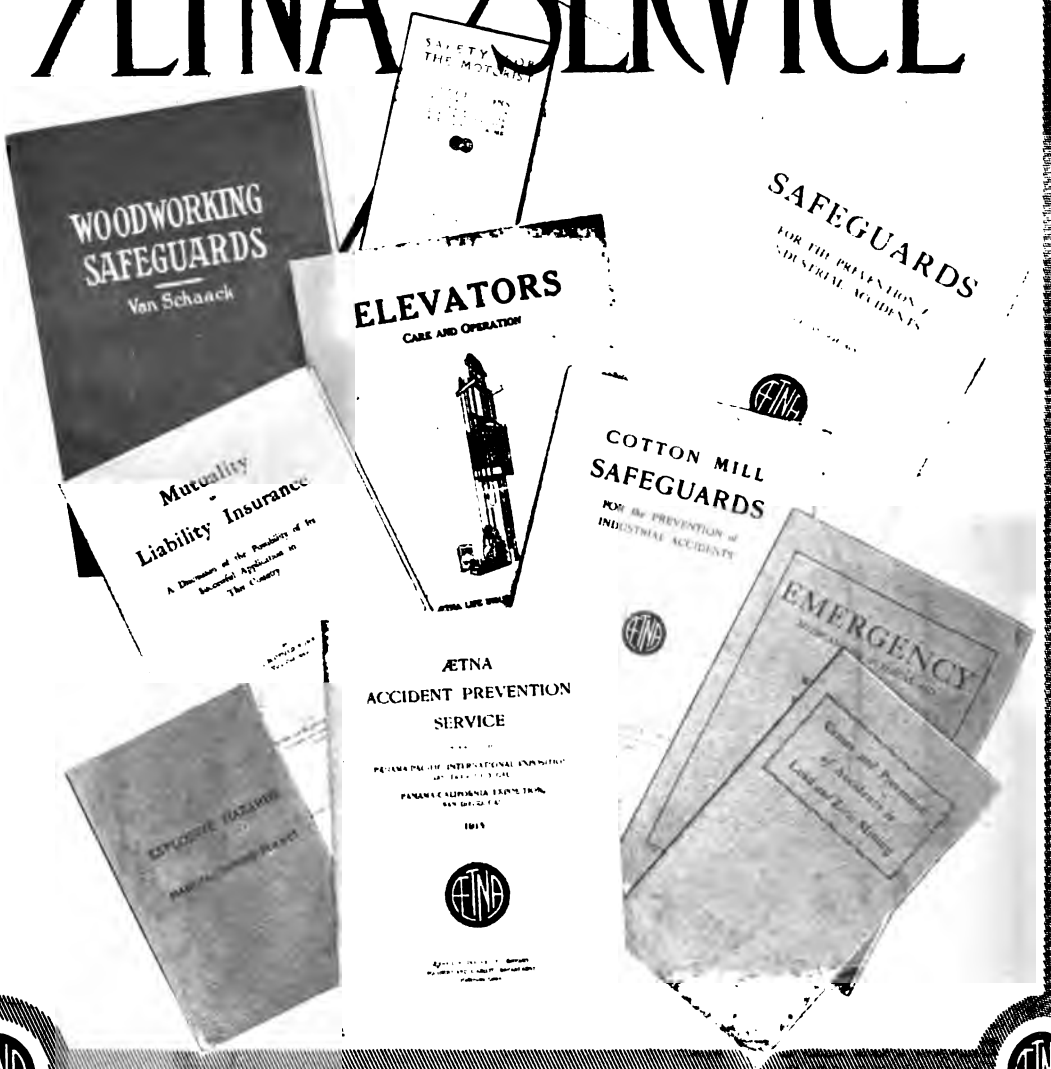
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Hartford, Connecticut

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXV. No. 3 MARCH, 1918 25 Cents

SAFETY FIRST

HITS THE BULL'S-EYE OF SAFETY!

The "PIONEER" Steel Shaft Hanger is UNBREAKABLE Because It Is Made of Open Hearth Steel. The Rugged Construction of "PIONEER" Withstands Sudden Shock, Violent Strain, Hard and Long Service. Men Working Under "PIONEERS" Are Safe From Breaking Hanger Accidents.

STANDARD PRESSED STEEL COMPANY, PHILADELPHIA

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UNDERWRITERS' LABORATORIES
SAFETY APPLIANCE
No. 59
August 16, 1917
INSPECTED

The "DUSTITE" RESPIRATOR

WHAT A PROMINENT USER SAYS ABOUT IT

INTERNATIONAL CARBON PRODUCTS COMPANY
Incorporated
120 Broadway, N. Y.

Nov. 19, 1917

Walter Soderling, Inc.
347 W. Broadway,
New York City.

Gentlemen:

The Dustite Respirator has had a thorough test in our plant in New York City. We are pleased to report that it has proved one hundred per cent for comfort and efficiency. Also we are advising its adoption in our other plants.

Very truly yours,
International Carbon Products Company.
(Signed) Nathaniel Johnson,
Mech. Eng.

THE "DUSTITE" RESPIRATOR

IS APPROVED BY
UNDERWRITERS' LABORATORIES
FOR PROTECTING WORKMEN IN
ALL DUSTY TRADES.

WALTER SODERLING · INC · MANUFACTURERS
DUSTITE
RESPIRATOR

WALTER SODERLING, INC.

347 West Broadway — New York City

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Vol. XXXV. No. 4 APRIL, 1918 25 Cents

PROTECT HIS EYES WITH

STOCO

SAFETY GOGGLES

For comfort, complete protection, durability and simplicity of design and construction specify Stoco Safety Goggles.

A request on your letterhead will bring a sample and complete information by return mail.

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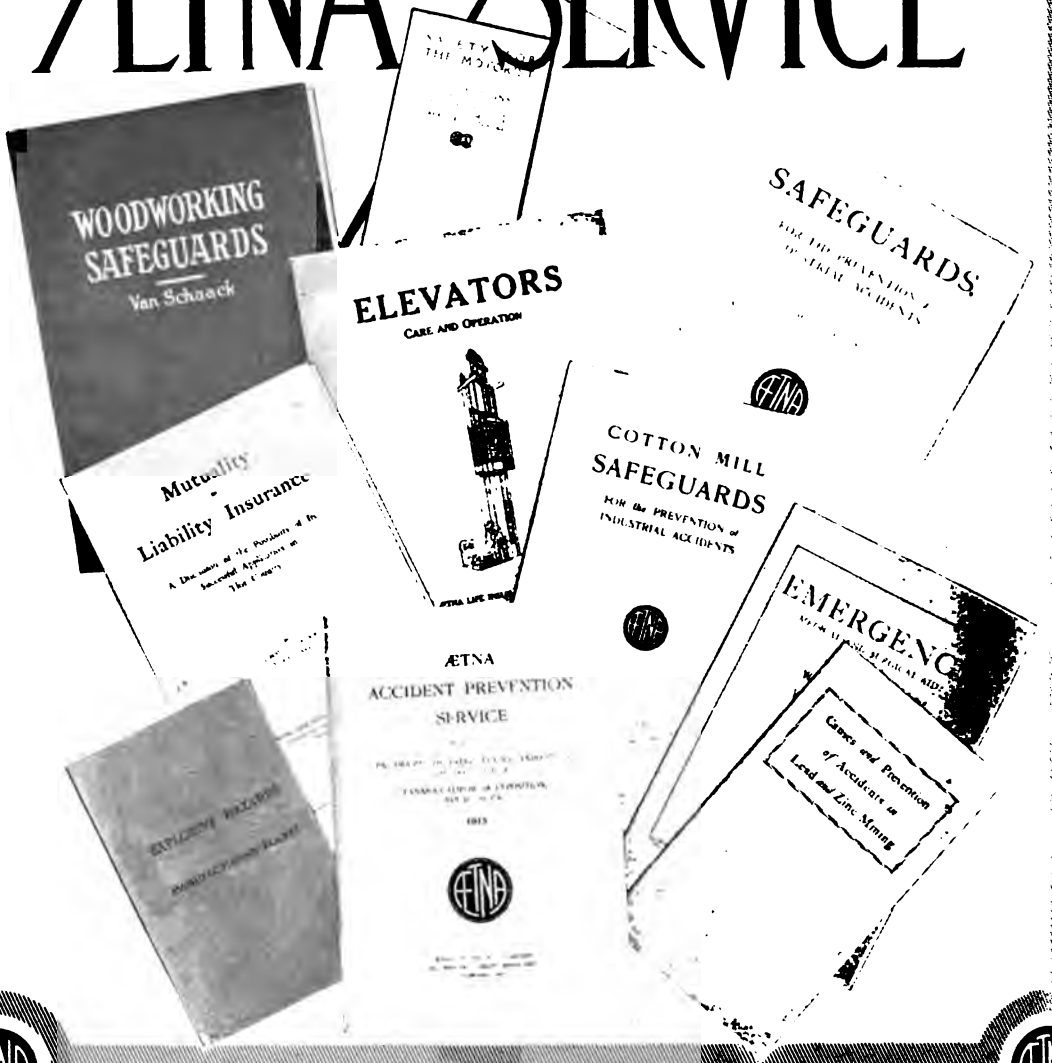
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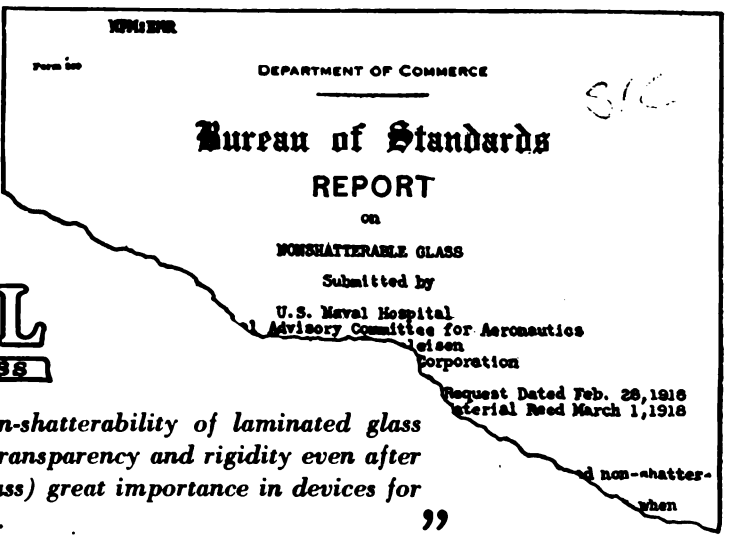
SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXV. No. 5 MAY, 1918 INDEXED 25 Cents

THE U. S. BUREAU OF STANDARDS SAYS OF

RESISTAL
TRADE MARK
REINFORCED GLASS



"The relatively increased non-shatterability of laminated glass and its comparatively good transparency and rigidity even after puncture give it (Resistal glass) great importance in devices for protecting the eyes and face."

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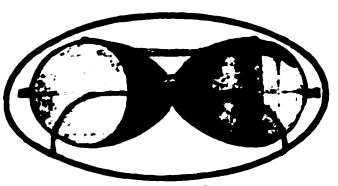

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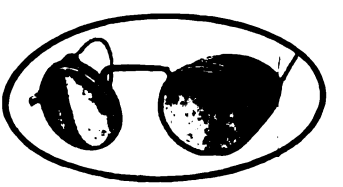

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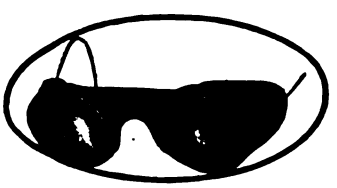

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DON'T MERELY ORDER GOGGLES. SPECIFY RESISTAL LENSES

SEND FOR COMPLETE ILLUSTRATED GOGGLE AND SAFETY EQUIPMENT CATALOG

The Strong, Kennard & Nutt Co. 2044 E. 9th St. CLEVELAND, OHIO

The

"DUSTITE" RESPIRATOR

WHAT A PROMINENT USER SAYS ABOUT IT

H. K. MULFORD COMPANY,
Manufacturing Chemists,
Philadelphia, Pa.

October 17, 1917

Mr. Walter Soderling,
347 W. Broadway,
New York City.

My dear Sir:

I am more than pleased to report that the Dustite Respirator, which we have tried out, proves to be unquestionably the best thing of its kind we have had; and I am placing an order for more of these with our Purchasing Department today.

Very truly yours,
(Signed) Robert White
H. K. MULFORD COMPANY,
Lab. M'g'r.

THE "DUSTITE" RESPIRATOR

IS APPROVED BY
UNDERWRITERS' LABORATORIES
FOR PROTECTING WORKMEN IN
ALL DUSTY TRADES.

WALTER SODERLING, INC.
347 West Broadway New York City

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXV. No. 6 JUNE, 1918 SIC 25 Cents

"PIONEER"

STEEL SHAFT HANGERS OVERHEAD Mean SAFETY UNDERNEATH

Industrial Safety Requirements of To-day Demand Steel

STEEL STANDS FOR STRENGTH AND SAFETY. STEEL WITHSTANDS SHOCK, STRAIN, HARD AND LONG SERVICE MORE SUCCESSFULLY THAN ANY OTHER MATERIAL AND THAT IS WHY

"Pioneer" Shaft Hangers

ARE MADE OF UNBREAKABLE OPEN HEARTH STEEL.

STANDARD PRESSED STEEL CO.

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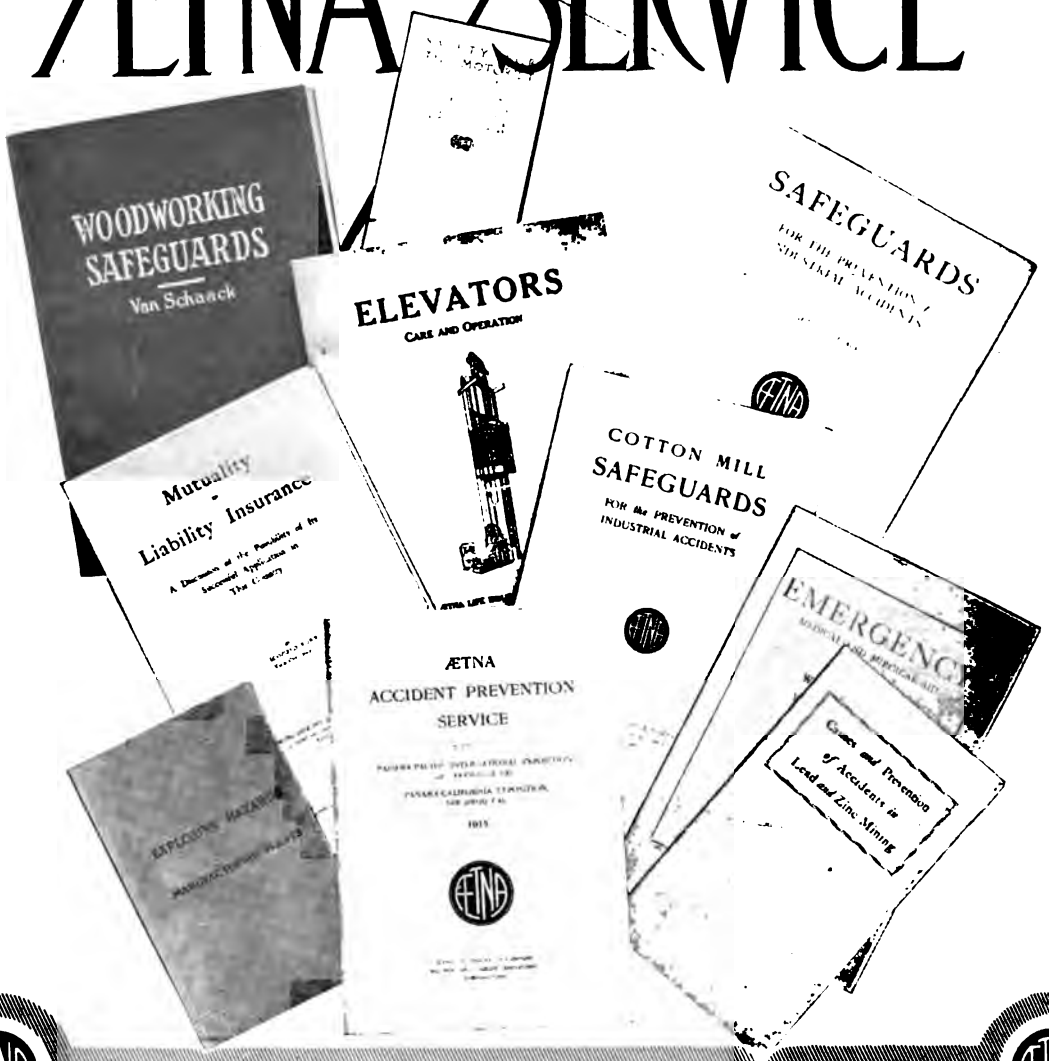
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Remember You Saw This in Safety Engineering

Follow the example of the Government, install AERO AUTOMATIC FIRE ALARM PROTECTION at once.

Aero Fire Alarm Protection is being installed in base hospitals, Government warehouses, shipyards, piers, etc.

Recent Fires and Their Lessons

Had the following premises been protected with "AERO" Automatic Fire Alarm, these fires would have been instantly detected. Fires in their incipiency can be easily extinguished—that means these losses were preventable.

Date		Loss
Mar. 16	Cumberland Valley Spoke & Bending Co., Hagerstown, Md. Fire discovered by passerby	$40,000
Mar. 19	Drug Store, Lethbridge, Alta, Can	70,000
Mar. 26	Lindemann & Hoverson Stove Works, Milwaukee, Wis. Fire discovered by employe	16,000
Mar. 29	Thompson Furniture Co., Duluth, Minn. Fire discovered by citizen	67,000
Mar. 29	Retail Store, Cloquet, Minn. Fire discovered by passerby	45,000
Mar. 30	C. B. Loeber & Sons, Wilmington, Del. Fire discovered by passerby	12,000
Mar. 30	Adamson Machine Company, Akron, Ohio. Fire discovered by night force	60,256
Apr. 1	Avis Flour Milling Co., Waldron, Mich. Fire discovered by watchman	5,000
Apr. 4	Narragansett Machine Company, Pawtucket, R. I. Fire discovered by watchman	147,000
Apr. 5	First Congregational Church, Prophetstown, Ill. Fire discovered by adjoining property owners	TOTAL
Apr. 7	Boston Elevated Railway Car House, Somerville, Mass. Fire discovered by employes	250,000
Apr. 14	E. C. Lloyd; E. F. Marqued, Weymouth, Mass. Two persons killed	2,000
Apr. 15	F. M. Martin Grain & Milling Co., Cheney, Wash. Fire discovered by employes	150,000
Apr. 15	Alden, Speare's Sons Company, Cambridge, Mass. Fire discovered by chauffeur	28,600
Apr. 25	Continental Clothing Store, Eau Claire, Wis. Fire discovered by neighbor	100,000

The above fires are a few selected from a great many which have recently occurred wherein there was no automatic fire alarm protection. Many of these fires were beyond control before discovered.

Aero Automatic Fire Alarm

"The live wire that detects the fire".

installed in a building, gives immediate announcement of the presence of fire. It is the surest protection; fire can never surprise it, but always finds it ready to give instant alarm.

"AERO" is adaptable for all classes of buildings. Let our engineers advise you.

AERO ALARM COMPANY

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Instruct your broker to be sure to put you in the

General Accident

Fire & Life

Assurance Corporation, Ltd.

FREDERICK RICHARDSON
United States Manager

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Three publications have been combined with Safety Engineering:
FIRE PREVENTION, CONSERVATION and PROTECTION ENGINEERING

FRANKLIN WEBSTER, Editor

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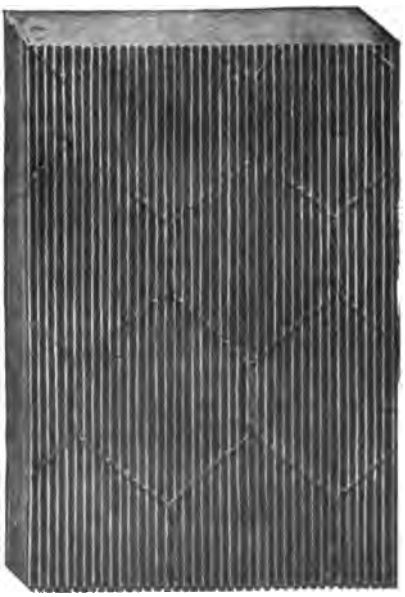

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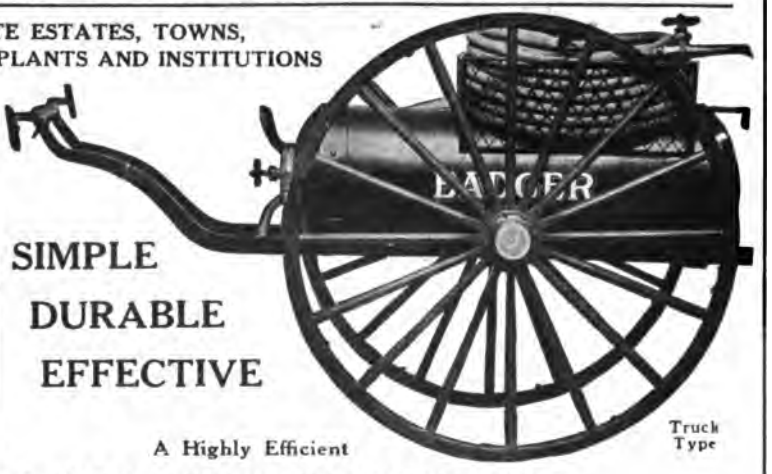

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Not a Shingle Broken!

The above picture is of the Brooks Public School, 57th and Haverford Ave., Philadelphia, Pa., which was destroyed by fire on January 23 last, with an estimated loss of $200,000 and which cost the lives of several firemen.

To the right of the ruins may be seen a small two room school building made of

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FRONT VIEW, PULMOSAN FACE MASK. No. 20.

THE NEW "PULMOSAN" FACE MASK No. 20

PRICE $12.00

REAR VIEW.

COMPLETELY PROTECTS RESPIRATORY TRACT, NOSE, EYES AND FACE.

FROM IRRITATING DUST AND FUMES

This mask is made of light but durable metal, and is held in position by means of straps around the head of the wearer. Eye pieces are exceptionally large and insure good vision. Colored lenses may be had at slight additional cost. A lateral fin, (shown in rear view of mask) fitted inside of mask, prevents fogging of lenses by worker's breath. Air is exhaled through automatic valve which cannot get out of order.

It is of sanitary construction and can be taken apart for cleaning. Being light and air-cushioned, it fits any face comfortably, combining both face and eye protection in an ideal manner.

This mask can also be equipped at small cost with a rubber cape of airtight construction, which covers entire head of the worker. This cape is of comfortable and simple construction and should be used where greater protection to head and shoulders is needed.

FACE MASK EQUIPPED WITH CAPE.

"PULMOSAN PRODUCTS PROTECT"

Multi-Metal Separating Screen Company

247 West 19th Street **New York City**

Remember You Saw This in Safety Engineering

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Samson Fire Alarm Systems

Signal Station Closed

CLOSED CIRCUIT
CODE RINGING

Are An Investment, Not An Expense

They mean SAFETY for the occupants of your building in case of fire and very often save the building itself, by giving your fire brigade a quick notification as to the location of the fire.

Control Cabinet

We make complete systems to operate on 110 volts D. C. or A. C. current, also on Samson Battery or storage battery. All systems are approved by the Industrial Commission of the State of New York.

Consultation invited with engineers, builders and architects.

Send for our Catalogue.

Samson Electric Co.

Established 1882

Canton, Mass.

NEW YORK OFFICE
1270 Broadway

Single Stroke Bell

Remember You Saw This in Safety Engineering

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WIRE GLASS WINDOWS

Safeguard all buildings against fire spread. No matter what the construction, if the windows are not *Approved* wire glass in *Approved* metal frames, there is danger to the spread of fire through windows.

SAFETY GLAZING

Look for the three twist at the vertical strand. This is our distinguishing mark as authorized and approved by the Underwriters Laboratories.

This company has specialized in the manufacture of high quality wire glass for many years.

"WESTERN WIRE GLASS"

is dependable for all requirements.

WESTERN GLASS COMPANY

STREATOR, ILL.

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THE SAFE-CABINET

Drafted for Duty

ANSWERING the nation's call to duty is a further honor that has been conferred on THE SAFE-CABINET. Now, in many cantonments, "The World's Safest Safe" is a familiar sight.

The preparation of detailed information in connection with every boy in khaki has been an enormous task. But once accomplished, these records represent untold value.

And so, in many cases, THE SAFE-CABINET has been assigned to guard duty. It protects thousands of these priceless records—documents that are playing a most important part in making the world safe for democracy.

Where Do You Keep Your Records?

Every record has value. Some are more priceless than you may realize. They play an important part in your business or profession. If they were worth making, they are worth protecting.

The Underwriters' Laboratories have given THE SAFE-CABINET their highest endorsement. It has met the rigid requirements of this board of fire protection authorities. And it will meet your every need—in protection, convenience, portability and privacy.

Send the coupon today for documentary evidence and data on the model for your individual requirements.

THE SAFE-CABINET CO.

Originators and Sole Manufacturers of

THE SAFE-CABINET

95 Green St., Marietta, Ohio

THE SAFE-CABINET COMPANY
95 Green Street
Marietta, - - - - Ohio

My records are of the following classes:

1.....
2.....
3.....
4.....

Please send SAFE-CABINET data covering my requirements and documentary evidence of efficiency.

Name .....
Business .....
Address .....

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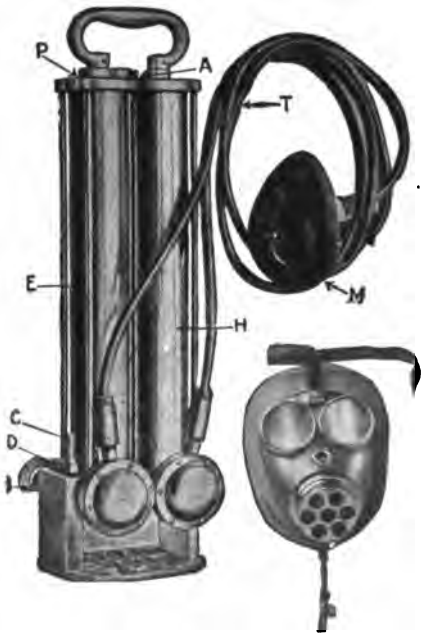
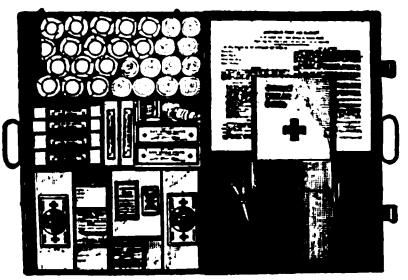
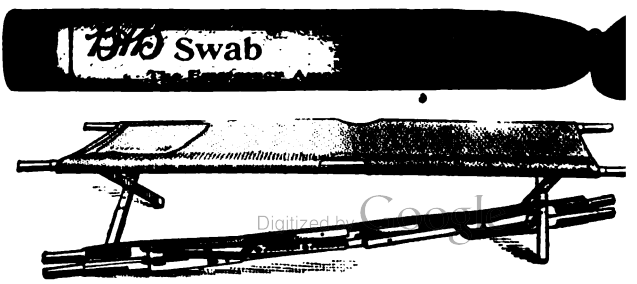


Complete Industrial

THE more complete the equipment of the safety department the more efficient will be its work. The fundamental and patriotic duty of every American employer today is to safeguard his employes against preventable injury, which can be done most surely by providing efficient safeguards. It is likewise his duty to provide the best possible means for taking care of those who may be injured by providing a well equipped emergency first aid room. This is a sound investment.

STRONG, KENNARD & NUTT CO.,





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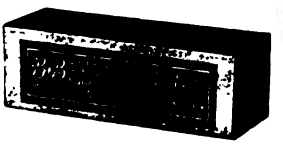

Safety Equipment

To furnish such requirements we have a most complete stock of safety devices, first aid equipment and supplies embodying only articles of proven worth. Whether your plant be one employing a few men or many thousands, we are prepared to supply all those things necessary for safeguarding life and limb and giving complete safety service in its broadest aspect.

Send for our complete catalog. Write or wire us for whatever you need and be assured that you will receive prompt and efficient service.

2044 E. 9th St., Cleveland, O.

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Safeguard
Practicools

Your men take "va
again. Will they be
their energy, makes
at machines — keep
for more output and

Think what pure, sparkling
their toes — make them
equipped for their comfort.
power insurance you can

Saving

Practicools are not an expense.
prevented, averages $8.69 per
five minutes is wasted per man
water to run cool—walking
back, one hundred men cost
installed for ***less,*** and you are
every 100 men.

Practical experience and
conditions prove that the
but in getting along without

Practicools chill water to a temperature of 50° in the dead of summer—ice consumption is lower than in any other make.

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hot weather's production

on the job—keep men at machines

cations"—are here today—away tomorrow and back ***more*** steady when the stifling weeks ahead reduce every move an effort? Then how will you keep them your production up—meet the stiffening demands ***still more?***

ice cooled water can do for ***you***—for ***them.*** It will keep them on feel like work—certainly prevent shifting to plants not so well Practicools in every department ***now*** is the least expensive man buy.

Outbalances Cost

Their tangible results in dollars saved, in terms of time waste year per man. Figure it out if the average wage is $3. and only waiting in line for drinks—waiting for the long distances from machine to faucet and you $869.00. Many bubblers can be losing a lot more than $869.00 a year on

carefully conducted tests under varying expense isn't in getting the Practicools them.

Thirty Day Wait May Be Too Late

Delay your order for thirty days—***even ten*** and you may be too late. Our ready-to-ship-stock is fast dwindling—our rate of production cannot meet the rate of orders. Ask us to send full particulars today on the "Practicool"—the bubbler whose price, design, workmanship, practicability and strength admits no peer.

GLAUBER BRASS MFG. CO.
Cleveland, Ohio

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The

Edison

Is the Standard Electric Safety Mine Lamp

The EDISON MINE LAMP is part of the *standard* equipment for coal mines, metal mines, gaseous tunnels and excavations, etc. Its record is one of unqualified success. Today over 110,000 are in use, giving steady, reliable, ample light. They have the EDISON steel-and-iron construction—the strength for mine work.

Ask for details and Bulletin 300-O

EDISON STORAGE BATTERY COMPANY

Factory and Main Office, ORANGE, N. J.

DISTRIBUTORS IN

New York Boston Chicago Detroit San Francisco Seattle Los Angeles New Orleans Kansas City Washington Philadelphia

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General Distributors: Mine Safety Appliances Company
Chamber of Commerce Bldg., Pittsburgh, Pa.

THE
AMERICAN
APPARATUS
DEVELOPED
AND
MADE IN
AMERICA
BY
AMERICAN
WORKMEN

THE GIBBS

SELF-CONTAINED OXYGEN RESCUE APPARATUS

Designed and adopted by U. S. Bureau of Mines. *The Gibbs* is the lightest, simplest and best Oxygen Breathing Apparatus yet developed. Tests prove that in its operation *The Gibbs* gives the most perfect approximation to *normal breathing* ever attained in any type of apparatus.

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285 Sets of Gibbs Apparatus now in Govt. service.

MINE SAFETY APPLIANCES CO.

Chamber of Commerce Building, PITTSBURGH, PA.

"Everything for Mine and Industrial Safety"

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Washroom of New Process Gear Corporation, Syracuse, N. Y.

They'll pay it back many times

—those employes of yours—after you have made your investment, on their account, in a line of sanitary plumbing equipment designed to increase the energy, the working spirit, the efficiency and self-respect of each one.

Working people are worth vastly more to themselves and their employers when ability to do is spurred by *eagerness* to do. There's nothing theoretical about this. It is substantiated by many factory owners whose experiences have made it possible for "Factory Sanitation" to be written. A free copy will be sent to you on request.

"Standard" Plumbing Fixtures

"Standard" Wholesale Houses

In the cities marked thus (*) at the bottom of this page there are "Standard" Wholesale Houses carrying in stock complete lines of

Supplies and Tools

for Mills, Mines and Factories also the Water, Gas, Steam and Oil Industries. Write to or call upon the nearest wholesale house.

Standard Sanitary Mfg. Co.

render satisfactory service to factory owners throughout the country. Installations of all kinds, large and small, have been furnished by us. Our facilities for manufacturing in large quantities insure prompt shipment and a completely satisfying service. **This is a particularly timely question** because of the growing necessity for putting more women in the places formerly held by men. Factory sanitation thus becomes a more pressing necessity. "Standard" **Plumbing Fixtures for the Home** are described in a separate booklet, which will be sent free on request. A splendid line of fixtures for Bath, Kitchen and Laundry is shown.

Standard Sanitary Mfg. Co., Pittsburgh

Permanent Exhibits in These Cities:

NEW YORK.....35 W. 31ST
NEW YORK (EX. DEPT.).50 BROAD
BOSTON.....186 DEVONSHIRE
PHILADELPHIA...1215 WALNUT
WASHINGTON..SOUTHERN BLDG.
*PITTSBURGH..439-449 WATER
PITTSBURGH.....106 SIXTH
*CHICAGO.....14-30 N. PEORIA
ST. LOUIS.....100 N. FOURTH
*ST. LOUIS.....810 N. SECOND
*E. ST. LOUIS..15 COLLINSVILLE
*CLEVELAND.....4409 EUCLID
CINCINNATI.....633 WALNUT
*TOLEDO.....311-321 ERIE
*COLUMBUS..243-255 S. THIRD
*CANTON...1106 2ND ST. N. E.
*YOUNGSTOWN.458 W. FEDERAL
*WHEELING.....3120-30 JACOB
*ERIE.....128 W. TWELFTH
*ALTOONA.....918 11TH
*MILWAUKEE..95 W. WATER ST.
SAN FRANCISCO149-55 BLUXOME
LOS ANGELES.....671 MESQUIT
*HUNTINGTON, W. VA., SECOND AVE. AND TENTH ST.
*LOUISVILLE.....319 W. MAIN
*NASHVILLE...315 TENTH AVE. S.
*NEW ORLEANS.....846 BARONNE
*HOUSTON.....PRESTON & SMITH
*DALLAS....1200-1206 JACKSON
*SAN ANTONIO.....22 LOSOYA
*FORT WORTH,..828-830 MONROE
KANSAS CITY.....RIDGE ARCADE
*TORONTO, CAN..59 E. RICHMOND
*HAMILTON, CAN..20 W. JACKSON
DETROIT OFFICE..HAMMOND BLDG.
CHICAGO OFFICE..910 S. MICHIGAN

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PROTECT YOUR BUILDINGS AGAINST

FIRE

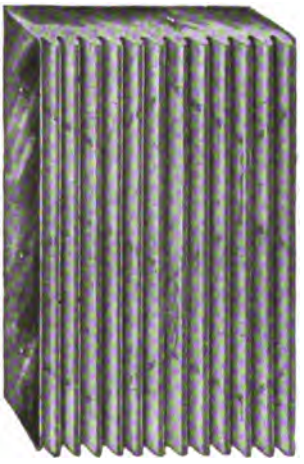
By using SOLID Wire Glass

The best Wire Glass
to use for Every purpose is

Aqueduct

WHY YOU SHOULD USE AQUEDUCT WIRE GLASS

1. It Is a Safeguard to Human Life.
2. It Is a Valuable Fire Retardant.
3. It Reduces Insurance Risks.
4. A Large Factor in Building Economy.
5. It Is the Best Light Diffuser.
6. It Is the Strongest Wire Glass Made.
7. It Costs Same as Ordinary Wire Glass.



WHAT TO SPECIFY IN WIRE GLASS.

SKYLIGHTS. ¼" Aqueduct W.G.
WINDOWS. ¼" Aqueduct W.G.
DOORS. ¼" Aqueduct, Cobweb and Polished W.G.
PARTITIONS. ¼" Aqueduct, ⅛" and ¼" Cobweb W.G.
TRANSOMS. ¼" Aqueduct, ⅛" and ¼" Cobweb W.G.
ELEVATORS. ¼" Aqueduct and Polished W.G.
DIFFUSION OF LIGHT. ¼" Aqueduct and Polished W.G.

The New Wire Glass

Special Note. The Only glass manufactured today in the world which prevents dripping from Condensations.

TEST IT YOURSELF BY SENDING FOR FREE SAMPLES TO

Pennsylvania Wire Glass Company

Works:
DUNBAR, PA.
WALTER COX, President

Pennsylvania Building
PHILADELPHIA, PA.

New York Office
20 West 34th St.

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"EBCO"

Sanitary Drinking Fountains and Industrial Efficiency

You, like all progressive employers, know the value of maintaining the greatest efficiency among your workers. The method you furnish drinking water to your employees directly affects their efficiency.

"EBCO" Sanitary Cooler Bubbling Fountains, illustrated herewith represent the latest and most approved method of furnishing drinking water. This fountain safeguards the health of every user in two ways: First, due to design and operation, the mouth of the user does not come in contact with any part of the fountain. This prevents the communication of diseases. Second, the water is furnished at a proper temperature, namely, about 50 degrees, thereby preventing cramps and shock from drinking water too cold during hot weather.

Modern sanitarians and industrial experts consider the modern sanitary cooler bubbling fountain one of the most important advances made towards maintaining the health of industrial workers, and industrial efficiency depends upon the good health of the worker.

Every industrial plant needs these drinking facilities. They prove an excellent investment. Write for descriptive literature and prices. Give your attention now to installing the modern safe sanitary method of furnishing drinking water.

D. A. EBINGER SANITARY MFG. CO.

COLUMBUS, OHIO

New York Minneapolis Kansas City

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invested in a postage stamp, with a sheet of letter paper, an envelope, and a moment of your time NOW will bring to you valuable information on the subject of Fire Prevention. Select the title that fits your needs—

Building Construction
Guarding Against Fire in Building a Home
Reducing the Fire Chance in Business Buildings
Fire Insurance and Fire Prevention

address the

HARTFORD
FIRE INSURANCE COMPANY
HARTFORD, CONN.

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TURNER CONSTRUCTION COMPANY

REINFORCED CONCRETE CONSTRUCTION

The Barrett Company, December 20, 1917.
New York, N. Y.

Gentlemen:

Herewith is the new composite drawing of all the buildings we put up last year—the "Turner Concrete City" of 1916.

So far as the roofs are concerned it is also a "Barrett City," for practically every roof in sight is yours. The use of The Barrett Specification, as you know, has been practically standard practice for years with us.

On these 70 various buildings we dealt with 31 prominent architects or engineers, and the general use of Barrett Specification Roofs tells its own story.

CONTRACT DEPARTMENT

One Year's Work of One Construction Company

Barrett Specification Roofs Cover over 90% of the Latest "Concrete City"—

The great Turner Construction Company has pictured in this drawing a composite view of seventy concrete buildings which they erected in 1916.

It is a representative group of modern industrial edifices and the principal architects and engineers of America cooperated with Turner in drawing designs and specifications.

Over 90% of all these buildings are covered with Barrett Specification Roofs.

Turner's letter, reproduced above, speaks for itself. Read it.

Barrett Specification Roofs are used on most of the permanent structures of the country.

This is not to be wondered at when you consider that they cost less per year of service than any other kind; that they are free from maintenance expense; that they take the base rate of fire insurance; and, finally, that *they carry a 20-Year Surety Bond Guaranty.*

To any one interested we will send free, on request, a copy of The Barrett 20-Year Specification with the necessary roofing diagrams.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit
Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria

THE BARRETT COMPANY, Limited:
Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

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THE NAME
EST.
Angell
1889
IS THE GUARANTEE

Tested and labeled by the Underwriters' Laboratories, Chicago.
Awarded gold medals second and third International Expositions of Safety and Sanitation, New York City, 1914, 1916.

DO IT NOW

EQUIP YOUR ELEVATORS WITH THE

Angell Floor Stop and Locking Device

It will prevent accidents such as shown on next page and will make such accidents impossible

The Angell Floor Stop and Locking Device is approved by State and City insurance inspectors everywhere

ANGELL ELEVATOR LOCK CO.,

Remember You Saw This in Safety Engineering

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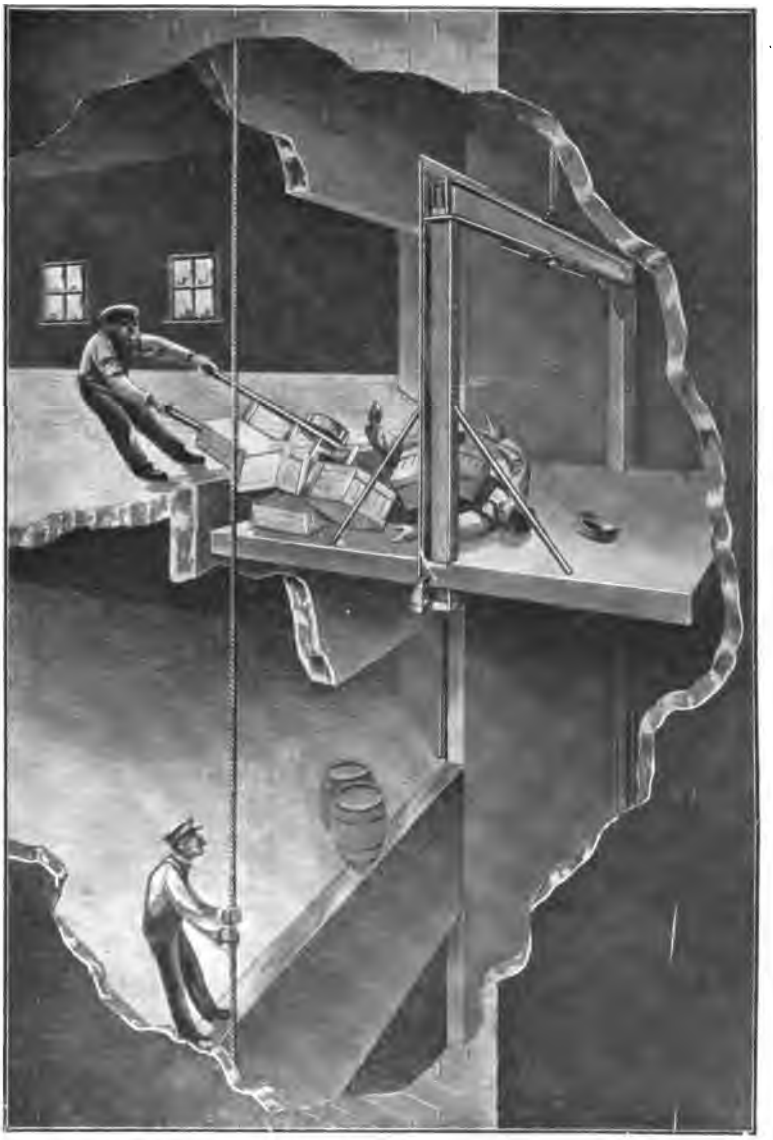
DON'T INVITE DISASTER ANY LONGER

UNPROTECTED ELEVATORS

ARE TAKING THEIR TOLL OF LIFE AND LIMB EVERY DAY. YOU NEVER CAN TELL WHEN ONE OF THESE FATAL OR SERIOUS ACCIDENTS DUE TO UNPROTECTED ELEVATORS, WILL HAPPEN IN YOUR PLANT. THEY CAN BE PREVENTED AND WILL BE IF YOU WILL EQUIP YOUR ELEVATORS WITH THE

Angell Floor Stop and Locking Device



370 Atlantic Ave., Boston, Mass.

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Steelcrete

Underwriters' Tested

The Master Method of Guarding Machinery

Quicker—Stronger—Cheaper

Guards of "Steelcrete" are quickly and easily fabricated by any mechanic. No special tools are required. There are no delays—no waiting for layouts nor plans. The "Steelcrete" guard can be built right on the job.

"Steelcrete" is more rigid than a flat sheet. It is amply strong for long unsupported guards. The edge of each "Steelcrete" diamond mesh is turned at right angles, for rigidity—it gives a maximum degree of visibility unattainable in any other fabric.

"Steelcrete" is easily worked. The cut or broken strands will never ravel. "Steelcrete" accessories (Angle Frames, Floor Sockets, Splice Bars, U-Edging, Safety Angles, Clips) facilitate the building of guards of any shape and size.

The finished "Steelcrete" guard costs less than any other method of protection. "Steelcrete" makes a handsome guard; it keeps the entire machine visible and accessible. It is permanent.

"Steelcrete" is Underwriters' Tested. It gives safe sure protection.

For manufacturers whose work is in accord with our Government's war program, "Steelcrete" is readily obtainable.

Our "Safety First" booklet is a much used handbook of Safety Engineering pertaining to machinery. It is free—also the booklet, "Underwriters' Inspected Steelcrete." Write for them today.

The Consolidated Expanded Metal Companies

BRADDOCK, PA.

Branch Offices

PHILADELPHIA, Larkin Bldg. PITTSBURGH, Oliver Bldg. CHICAGO, Otis Bldg.

Representatives

NEW YORK, 8 West 40th St. Expanded Metal Engineering Co.
BOSTON Penn Metal Co.
DALLAS Builders Metal Products Co.
SAN FRANCISCO Holloway Expanded Metal Co.
TORONTO Baines & Peckover

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Protect Not Only Your Equipment But Also Your Workers

You have more inexperienced help in your shops now than ever before; most concerns have in these days of labor scarcity. It is, therefore, more important now than ever before that you use every possible means to protect against carelessness or ignorance, not only those "green" men, but also the equipment which they must operate. It is right here you will appreciate the

"Circle T"

"Safety Service" Motor Starting Switch

IN STEEL BOX OPERATED FROM THE OUTSIDE

No Danger of Shock in Renewing Fuses or in Opening and Closing Switch

Safety Service Motor Starting Switch—Box Closed

Safety Service Motor Starting Switch—Box Open

Here are the Reasons—Switch is entirely enclosed and operated from outside. Box cannot be opened until switch is in "off" position.

Here is the Result—Workers and Equipment are Both Protected.

Send for Our Bulletin describing "Safety Service" Knife Switches

The Trumbull Elec. Mfg. Co., Plainville, Conn.

NEW YORK	CHICAGO	PHILADELPHIA	SAN FRANCISCO	BOSTON
114-118 Liberty St.	40 S. Clinton St.	1017-1019-1021 Race St.	595 Mission St.	76-78 Pearl St.

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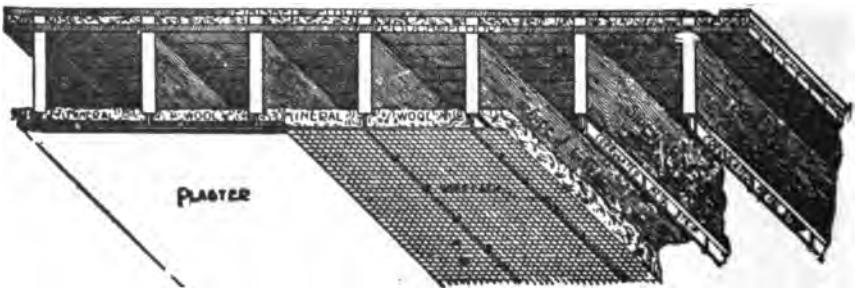
SEMI-FIRE PROOF CONSTRUCTION FOR CEILINGS, PARTITION

By the use of Mineral Wool applied as shown on cut below.



Samples and Circulars Free

U. S. MINERAL WOOL CO.,
280 Madison Avenue, New York

KEYLESS
AUX. FIRE ALARM BOX
SIZE 4X6 IN.

IN CASE OF FIRE BREAK THE GLASS AND PULL RING DOWN. HOLD DOWN FOR "RETURN SIGNAL" FROM THE STREET BOX IN MOTION.

The Gamewell Company

Manufacturers and Contractors for Over 57 Years of

Fire Alarms and Police Signal Telegraphs

Complete systems installed for municipal service, controlled by central office apparatus, and operated by storage battery, fitted with all the latest up-to-date appliances.

Our *Auxiliary System* makes it possible to connect interiors of premises *Instantaneously with Fire Department Headquarters*, through the *Public Fire Alarm Apparatus*, by providing any number of interior stations or signal boxes, from which the street alarm box can be operated instantly. Correspondence solicited.

GENERAL OFFICES AND WORKS,
NEWTON UPPER FALLS, MASS.
NEW YORK OFFICE, SUITE 5708. GRAND CENTRAL TERMINAL

WE NEED YOU

To Represent Us Locally In Your SPARE TIME

★ ★ ★ ★ ★ ★ ★ ★

SAFETY ENGINEERING

WILL PAY YOU A LIBERAL COMMISSION ON NEW SUBSCRIPTIONS SECURED BY YOU. WRITE TODAY FOR PARTICULARS—USE COUPON BELOW:

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Gentlemen: Send me particulars regarding your subscription proposition.

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Stoam-Tight Marine Condulets

V AND V-H SERIES WITH KEY SOCKET ATTACHMENT

Type V—One of a Complete Series of Condulets for Marine Use—Made in All Combinations and Sizes—Brass or Iron, as Specified

Write for Condulet Bulletin No. 1000-H

CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

NEW YORK BOSTON CHICAGO

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James Peters & Son

1934-38 N. Front St., Philadelphia

We manufacture Sliding and Swinging Fire Door hardware for all kinds of Fire Proof Buildings.

Approved by the Underwriters' Laboratories, Inc.

Send for descriptive literature.

BERNARD H. EIDEL
New York Agent

445 Canal St. New York

DANGER
2,200 VOLTS
KEEP OUT

Size 8 x 10"—18 Gauge Steel Porcelain Enameled

SIGNS

WE CARRY A LARGE STOCK

Send for Catalog and Prices

Safety Service and Supplies Co.

9003 Commercial Ave. Chicago, Ill.

EVERYTHING TO PREVENT ACCIDENTS

SAFETY FIRST

SIGNS The Silent Reminders —Always On The Job.

Like all manufacturers, no doubt, you also have dangerous places in your plant of which the men must be warned. There are different methods of giving this warning. You may hold a safety meeting and make a long speech to the men about being careful, etc., but, nine times out of ten, the chances are that they will forget most of what you have said to them. Therefore, as a continuous reminder that a hazard exists, there is nothing better than a sign. We furnish signs for all purposes. We have a great many stock designs, but we also make special signs when desired. We are at your service.

THE STONEHOUSE STEEL SIGN COMPANY

17th and Lawrence Sts. Denver, Col.

DANGER

ANY LETTERING CUSTOMERS DESIRE MAY BE PLACED IN THIS BLANK WHITE SPACE

Allen Safety Set Screws

Made in any diameter, length, point or thread. Send for samples.

THE ALLEN MFG. CO., 135 Sheldon St., Hartford, Conn.

HEADQUARTERS FOR ELECTRIC & PORTABLE
WATCHMAN'S CLOCKS
E. O. HAUSBURG, 45 MAIDEN LANE N.Y.
WRITE FOR CATALOGUE AND PRICES

DO IT NOW!

Subscribe to **SAFETY ENGINEERING** *$3 a Year*

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KRANTZ
TRADE MARK

KRANTZ SAFETY AUTO-LOCK
TRADE MARK
SWITCHING APPARATUS

Protects You From the Ever-Present Hazard of Electric Shock

CANNOT BE OPENED WITH SWITCH IN "ON" POSITION

NO LIVE PARTS EXPOSED WITH DOOR OPEN

You Cannot Come In Contact With Live Parts, Even If You Try

WRITE FOR PARTICULARS ON

Krantz Safety Auto-Lock Switches
TRADE MARK
Krantz Safety Auto-Lock Panels
TRADE MARK
Krantz Safety Auto-Lock Switchboards
TRADE MARK

KRANTZ M'F'G CO., INC., 160-7th St., Brooklyn, N. Y.

KRANTZ
TRADE MARK

Remember You Saw This in Safety Engineering

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STOP THE HIGH COST OF FALLING

Is there any real reason why "falling" should be the third largest accident classification? Why should ladders, scaffolding, platforms and runways be allowed year after year to make YOU, an employer, pay heavy accident compensation costs? A simple device will stop the high cost of falling. Do ALL your overhead oiling with

NUGENT SHAFT OILERS

No ladders, scaffolding, etc., are needed when these oilers are used. They induce REGULAR ATTENTION to overhead bearings. In terms of dollars and cents, not including accident costs, this means reduced friction, longer service for journals and bushings, fuller power transmission, coal saved. Can you reasonably afford to expose yourself to such accidents when the cost of this preventative is only $7.50?

When ordering, please state distance from floor to shaft. Price of tubing, 20c. per foot extra.

WM. NUGENT & CO.

Manufacturers of Oiling and Lubricating Devices, Oil Filters, Oiling Systems and Telescopic Oilers.

151-153 W. Superior St. Chicago, Ill.

Ever-Warm Safety-Suit

The REAL Life Preserver

Important Notice

The thousands of owners and friends of our great life saving suit will be interested in the fact that—

By a decision just handed down in the United States Circuit Court of Appeals, Judges Rogers, Hough and Hand, the International Life Suit Corporation's rights as the sole agents and distributors for the Ever-Warm Safety-Suit are absolutely established.

For free illustrated booklet, price list and order guide write to

INTERNATIONAL LIFE SUIT CORP.

(Sole Agents and Distributers for the United States, Canada and all foreign countries.)

10th Floor 11 Broadway New York

Telephones: Bowling Green 8609-8775

See our display booth on street floor.

Be Fire-Prepared

A quick, loud warning of fire has saved many a life. For safety sake, install the

Worcester Fire Alarm Gong

Its clear, distinctive sound will quickly warn employees of danger. In most cases, it is loud enough to warn the local fire department.

Comes in four sizes. Can be operated by steam or in conjunction with electrical alarm.

Write for booklet.

Union Water Meter Co.

Worcester, Mass.

This mask is Specially Designed for Ammonia Plant Engineers, City Firemen.

Manufacturing Chemists, or any one who comes in contact with deadly fumes.

RESPIRATORS

FOR EVERY SERVICE

The most complete line manufactured by any one firm in the United States. Face Masks and Respirators for Ammonia, Smoke, Dust and Chemical fumes.

Prices range from 50c. to $50.00 each. Send for descriptive price list.

HERBERT GARNETT

453 N. PROSPECT AVE.

GRAND RAPIDS, MICH.

Dept. E

Remember You Saw This in Safety Engineering

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A First Aid Room

in your plant will remind your workmen that there is a place in the factory where their cuts, bruises or injuries can be treated.

In time, they will acquire the habit of having their hurts treated at once in the First Aid Room. Then you and they will be saved from the consequences of neglected injuries.

A copy of our First Aid Guide should be in your plant. Write for a copy.

The Kny-Scheerer Corporation

404-410 West 27th Street **New York**

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CLEAN COAL—

CLEAN COAL
A MINER LOADING DIRTY COAL IS DISLOYAL-DO YOUR DUTY AND LOAD
CLEAN COAL
AZ A BANYASZ AKI PISZKOS SZENET RAKODIK.AZ HAZAFIATLAN
TEGYE MEG A KOTELESSEGET ES RAKJON
TISZTA SZENET.
IL MINATORE CHE CARICA CARBONE SPORCO E' SLEALE
FATE IL PROPRIO DOVERE E CARICATE
CARBONE PULITO.
BANIK NAKLADA NIE CISTE UHLIE JE NEVEDNÝ ROBTE
TVOJU POVINOST A NAKLADAJ
CISTE UHLIE
GORNIK ŁADUJACY NIECZYSTY WĘGIEL NIE JEST LOJALNY
PEŁNIJCIE SWOJ OBOWIĄZEK IDŁADUJCIE
CZYSTY WEGIEL

Put the CLEAN COAL idea right up to your Miners. Keep it before them at all times and hammer the idea into their brains by repetition. Make them see that the Miner loading Dirty Coal is Disloyal and a Slacker and that it is their duty to LOAD CLEAN COAL.

ORDER A SUPPLY OF THESE SIGNS TODAY—POST THEM IN CONSPICUOUS PLACES AND GET CLEAN COAL.

These signs are in stock ready for shipment, and we will forward immediately upon receipt of your specifications.

Everything for Safety, First Aid and Welfare.

Our Complete Catalog Sent Free on Request.

Send for Our Catalog on Industrial Playgrounds.

Size 18 x 12 inches. White Background—Blue Lettering with Red Border. Manufactured of 18 gauge iron, enameled with five coats of Porcelain Enamel, fused at 2000 deg. of heat.

SAFETY FIRST SUPPLY CO.
PITTSBURGH, PA.
BRANCHES: Bulletin Bldg., Philadelphia, Pa. 312-14 Walnut St., Cincinnati, O.

1849 1918

Springfield
Fire and Marine
Insurance Company
SPRINGFIELD, MASSACHUSETTS

LARGEST FIRE INSURANCE COMPANY

CHARTERED BY THE STATE OF MASSACHUSETTS
INCORPORATED 1849 CHARTER PERPETUAL

CASH CAPITAL $2,500,000.00

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LOSSES PAID SINCE ORGANIZATION.....$72,282,788.89

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No Soldered Joints

One Piece Front

Lenses Ground from Optical Glass

Solid Metal Side Shields

Light and Comfortable

Not a Weak Link in the Stoco SAFETY GOGGLE

There is not a single fault in the construction of the Stoco Safety Goggle—it is extremely easy to wear, is built to stand use and withstand abuse, and is completely protective.

All surfaces which bear on the face are broad and smoothly rounded so that it may sustain a heavy blow, or be worn for hours at a stretch without the slightest suggestion of cutting.

The ear-bows are thick and flexible so that they hold the goggle snugly in place without cutting and chafing back of the ears, and as the lenses are ground from real optical glass they cannot possibly tire the eyes or injure the vision.

The Stoco Safety Goggle will last indefinitely. It has no soldered joints to come apart, no screws to work loose and fall out, and the one-piece front, in addition to providing much needed protection **between** the eyes, makes it possible to build a very strong and rigid frame.

As it is constructed entirely of nickeled German silver, the Stoco Safety Goggle may be sterilized daily in hot water or live steam without damage. The solid metal side shields are perforated to permit an ample circulation of air around the eyes, yet are strong enough to protect the wearer from injury by flying rivet heads and other heavy missiles.

STANDARD OPTICAL COMPANY
GENEVA NEW YORK

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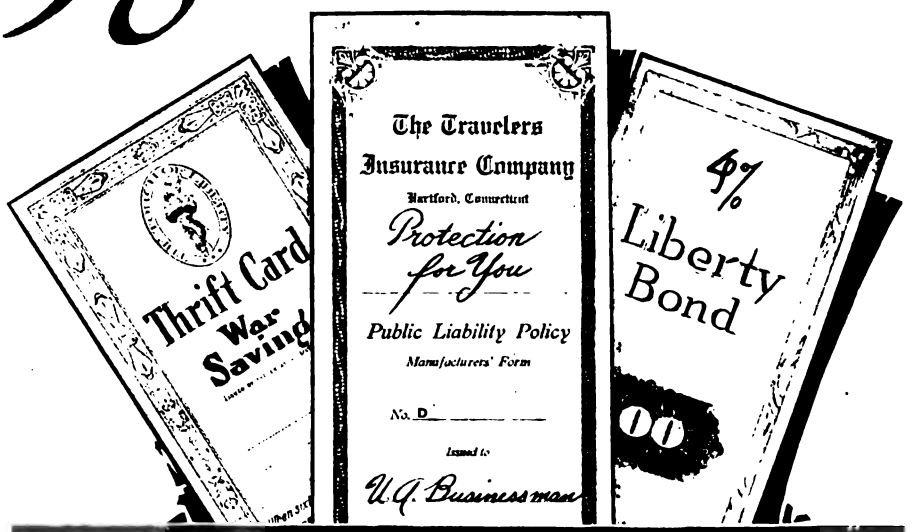
3 good investments



Travelers Policies
are the
Government Bonds
of Insurance

The TRAVELERS
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R. D. WOOD & CO.

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Iron Founders
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Single and
Double Valve
FIRE
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Manufacturers of All Kinds and Sizes of
Cast Iron Pipes

Manager of Casualty Dept. and Safety Engineer

would connect with a manufacturing concern employing 5,000 to 10,000 employees who carry own insurance, to take charge of Casualty Department, to handle underwriting and claim matters as well as safety organization.

Entirely familiar with above and now hold a responsible position in that line.

Box 1834, SAFETY ENGINEERING, 80 Maiden Lane, New York.

"ONE MAN"

One man and a "CHILDS" 40-gallon chemical engine is all that is needed to extinguish a fire if they are ready while the fire is in its early stage. The whole secret of extinguishing fires before they do damage, is to have immediately available the means for fighting fire. "CHILDS" 40-gallon chemical engine affords immediate facilities for successful extinguishing of fire. Every industrial plant, institutional building, hotel, hospital, school, needs one or more of these engines.

We will send a sample engine on approval to any responsible person or firm, subject to trial and inspection, with the understanding that if the engine does not prove to be satisfactory, it will be returned at our expense.

O. J. CHILDS COMPANY

UTICA, N. Y.

FIRE EXTINGUISHERS
MADE ON HONOR
"CHILDS"
SOLD ON MERIT
ESTABLISHED 1864

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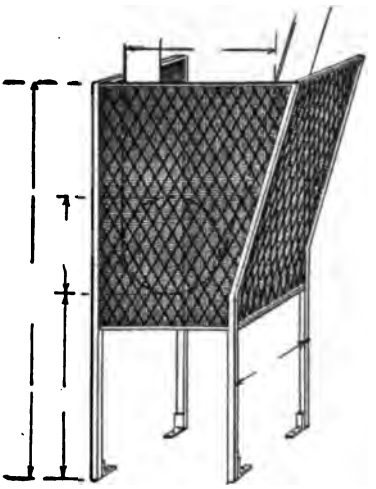
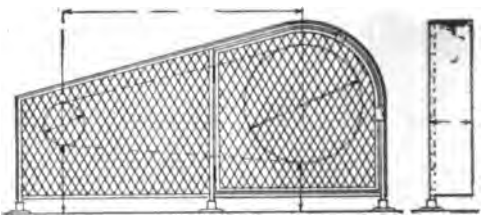


Machine Guards

Your own mechanic can install them. Made to meet every legal requirement. Note examples illustrated, showing ease in selection of design and taking measurements.

A Wright guard for every machine

Write us your needs



WRIGHT WIRE COMPANY

WORCESTER, MASS., U. S. A.

BRANCH OFFICES AND WAREHOUSES

Boston Providence New York Philadelphia
Chicago Tulsa San Francisco

ARE YOU THOROUGHLY COVERING THE FIRE AND ACCIDENT PREVENTION FIELD?

¶ SAFETY ENGINEERING is a live salesman welcomed each month by the men you are after.

¶ It is used very extensively as an advertising medium by progressive concerns who want to keep their product before the fire and accident prevention field.

¶ You cannot afford to leave SAFETY ENGINEERING out of your selling campaign.

¶ Our Copy Service department is always ready with new ideas that will help sell your product.

¶ Write today and let us tell you of a few of the successful selling campaigns in this field with which SAFETY ENGINEERING has been identified.

A. C. CARRUTHERS, Advertising Manager
SAFETY ENGINEERING
80 Maiden Lane New York City

Remember You Saw This in Safety Engineering

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Better Protection For Your Men

To safeguard your men against any possibility of an accident, you should equip your machines with guards that give a maximum of protection.

Mundt Perforated Sheets

are a preferred guarding material because they can be turned into machine-guards that are strong and serviceable.

These sheets are supplied in any thickness desired; also in any size.

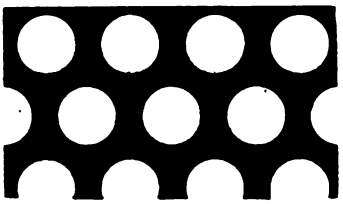
The perforations permit inspection of machinery and accessibility can be obtained by means of hinged doors.

Your local metal worker can make your guards from Mundt Perforated Sheets, or you can make them in your own shop.

Write us for full information.

CHARLES MUNDT & SONS

64 Fairmount Avenue
JERSEY CITY, N. J.



NOT A PIECE ESCAPED FROM THE HOOD

The picture shows a Model D protection hood with the cover removed, after a 16 x 2″ wheel had been broken within it to test its efficiency. *Not a piece of the broken wheel escaped from the hood.* What better protection for your workmen could you desire?

Not only is the danger from broken wheel practically eliminated, but provision is also made for a dust exhaust pipe.

NORTON COMPANY

Worcester, Mass.

New York Store
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Chicago Store
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875

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GEO. T. McLAUTHLIN CO.

120 FULTON STREET, BOSTON

Largest Manufacturers in New England of

FIRE DOORS AND SHUTTERS

Equipped with self-closing device insuring positive closing in case of fire.

APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS AND N. E. INSURANCE EXCHANGE.

DORLOC SAFETY DEVICE

Also Mechanical Dorloc Safety Device

We Remove Violations

Phone Bryant 4282 — **FRANZ A. BOEDTCHER** — 355-359 W. 42nd St. New York City

"STRONG AS THE STRONGEST"

THE NORTHERN ASSURANCE CO.

(LTD. OF LONDON)

ORGANIZED 1836 — ENTERED UNITED STATES 1854

Losses Paid $105,000,000
Losses Paid in U. S..... 38,000,000

Eastern and Southern Departments — 55 John Street, New York

THE LEADING FIRE COMPANY OF THE WORLD

ROYAL INSURANCE COMPANY LIMITED

[of Liverpool, England.]

New York Office, 84 William Street

Your Prospective Customers

are listed in our Catalog of 99% guaranteed Mailing Lists. It also contains vital suggestions how to advertise and sell profitably by mail. Counts and prices given on 6000 different national Lists, covering all classes; for instance, Farmers, Noodle Mfrs., Hardware Dlrs., Zinc Mines, etc. *This valuable Reference Book free.* Write for it.

Strengthen Your Advertising Literature.

Our Analytical Advertising Counsel and Sales Promotion Service will improve both your plan and copy, thus insuring maximum profits. Submit your literature for preliminary analysis and quotation—no obligation.

Ross-Gould Mailing Lists St. Louis

SAFETY ENGINEERING

$3.00 a Year

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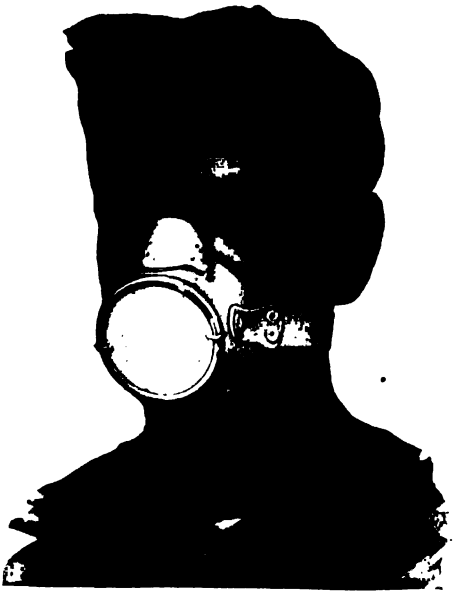
WALTER SODERLING INC MANUFACTURERS
DUSTITE
RESPIRATOR



The

"DUSTITE" RESPIRATOR

WHAT A PROMINENT USER SAYS ABOUT IT

H. K. MULFORD COMPANY,
Manufacturing Chemists,
Philadelphia, Pa.

October 17, 1917

Mr. Walter Soderling,
347 W. Broadway,
New York City.

My dear Sir:

I am more than pleased to report that the Dustite Respirator, which we have tried out, proves to be unquestionably the best thing of its kind we have had; and I am placing an order for more of these with our Purchasing Department today.

Very truly yours,
(Signed) Robert White
H. K. MULFORD COMPANY,
Lab. M'g'r.

THE "DUSTITE" RESPIRATOR

IS APPROVED BY
UNDERWRITERS' LABORATORIES
FOR PROTECTING WORKMEN IN
ALL DUSTY TRADES.

UNDERWRITERS' LABORATORIES
SAFETY APPLIANCE
No. 59
August 16, 1917
INSPECTED

WALTER SODERLING, INC.
347 West Broadway New York City

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"An Ounce of Prevention Is Worth a Pound of Cure"

Homes, Residences, Institutions, Factories, Industrial Plants, etc., inspected from a practical standpoint with a view of reducing the fire hazards at a minimum cost.

Fireproofing, Construction work of all kinds to reduce the fire hazard and comply with regulations of the various City and State Departments, estimates for which will be cheerfully furnished without charge.

Installation of approved interior fire alarms, manual or automatic, under the direction of Electrical Experts.

Uniformed retired Officers and members of the New York Fire Department of good character and long experience supplied upon early notice, to act as Superintendents, Watchmen, Guards or in other capacities as their services may be desired.

Portable fire appliances of all kinds installed and employees instructed in the intelligent use and handling of same.

Volunteer Fire Departments organized and drilled upon efficient and practical lines, similar to that of the New York Fire Department.

Consultations invited with architects, builders, engineers, from a fire standpoint; plans prepared and necessary argument made for presentation to the Board of Standards or other Departments for cancellations or modifications of orders where conditions warrant.

The Croker National Fire Prevention Engineering Company

Wilson Building, 1270 Broadway, New York

EDWARD F. CROKER,
Ex.-Chief N. Y. Fire Dept., Pres.

Telephone 77 78 Madison Sq.

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THE *Falls* AUTOMATIC ENGINE STOP

is being used by many of the leading concerns throughout the country to protect their plants and employes from

FLYWHEEL EXPLOSIONS

Is exceedingly simple in design and operation

Ask for information quick.

FALLS MACHINE CO., Sheboygan Falls, Wis.

THE SIGN OF GOOD CASUALTY INSURANCE

Workmen's Compensation, Employers' Liability, General Liability, Owners' Liability, Landlords' Liability, Elevator, Teams, Boiler, Credit, Burglary, Automobile and Personal Accident and Health Insurance.

INSPECTION SERVICE:

The Company inspects the plant and equipment of its policyholders and advises as to the installation of safety devices and as to the elimination of dangerous conditions with a view to prevention of accidents. This service is most thorough and scientific.

Established 1869.

LONDON GUARANTEE & ACCIDENT CO., LTD.

Head Office—CHICAGO, ILL.

THE E. HOWARD CLOCK CO., Boston, Mass.

The very latest thing in a watchman clock record. Entire record sheet always visible at once. Can be used without change from Saturday to Monday, or over a holiday, and a clear record secured.

Please write any of our offices, Boston, New York or Chicago, for particulars, or address E. A. Bigelow, Treasurer, 373 Washington St., Boston, Mass.

WANTS

POSITIONS SEEKING MEN
MEN SEEKING POSITIONS

SITUATION WANTED—Middle aged man desires position as Safety Director of large Corporation, Steel Company preferred. 20 years Military, Safety and Police experience. A-No. 1 references. Box No. 1833, Safety Engineering, 80 Maiden Lane, New York City.

Asbestos Gloves and Specialties

Our Asbestos Gloves, Leggins and Mittens will protect workmen's hands and feet against heat and hot fluids.
Strong, tough, absolutely fireproof—they safeguard against burns or loss of limb or life.
Full information and prices on request.

GEO. W. GERDING

Mfr. of Asbestos Specialties

405 Commerce St. Philadelphia, Pa.

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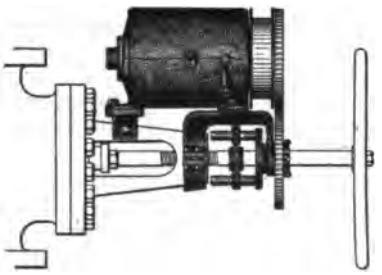

Now, You Can't Afford Engine Accidents

Can you afford to take chances and risk a shut-down at this time of labor stringency and high labor costs?

One of the many possible engine mishaps, such as breaking or slipping of governor belts, stranding of rope, racing, etc.—may occur at a critical moment—are you prepared?

Monarch Engine Stop

will automatically stop your engine in case of emergency.

If you are equipped with the Monarch, you are protected completely for your engineer cannot start his engines unless he uses the engine stop.

Besides protecting your men and property, it reduces your liability insurance rate.

Our engineers will be glad to advise you, regarding your engine hazard. Write for catalogue.

Consolidated Engine Stop Co. Inc.

Specialists in All Types of Engine Stops and Speed Limit Devices

133 West 19th Street New York

Navy Needs At Once 1,000 Gas Engine Men

The Naval Reserve Force must enroll at once 1,000 men experienced in the operation and maintenance of gasoline engines.

This is an urgent call. The men are required for immediate duty. They will be rated as Machinist's Mates.

Age limits are eighteen to thirty-five inclusive. Applicants must be American citizens. Draft registrants with letters from their local boards will be accepted.

Apply at Naval Reserve Enrolling Office, 51 Chambers Street, New York, or any Navy Recruiting Station.

Remember You Saw This in Safety Engineering

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Dodge the Handling Hazard

Take the tool to the work!

Crane—Trucking—Adjusting—Sawing—then readjusting for each cut—every one of these operations carries a hazard where the old-fashioned saw methods are practiced. How much better and safer to

Cut Sprues, Gates and Risers with

OXWELD BLOWPIPE

It's the modern, safe, economical way—as easy to handle as an air-chisel. Most every large steel mill now uses Oxweld Equipment. One large manufacturer says the Oxweld Blowpipe saves him twelve cents a ton on his entire output.

Oxweld Process is one that every safety engineer should know thoroughly. It is the original (and the only) "Low Pressure" system, amply safeguarded in every way. We'll gladly tell you all about it if you'll give us an opportunity.

Oxweld Equipment operates efficiently on gases other types waste.

OXWELD ACETYLENE COMPANY

NEWARK, N. J. CHICAGO LOS ANGELES

Largest Makers of Welding and Cutting Equipment in United States

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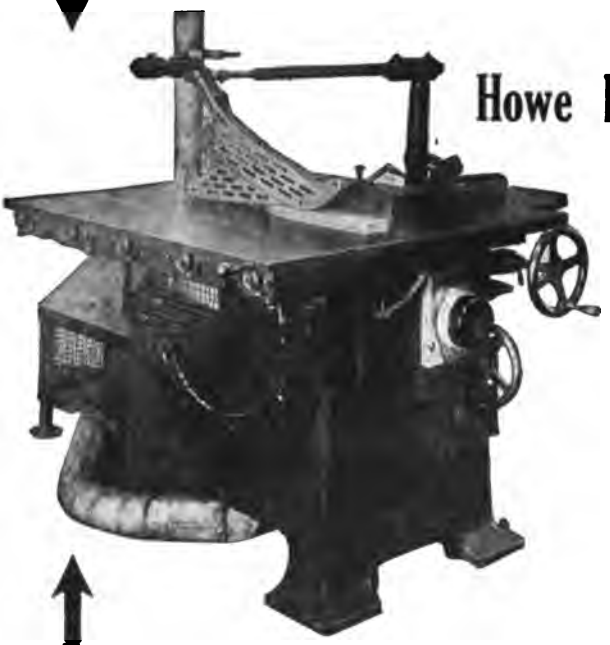
The Saw Guard of Safety and Convenience

A saw guard to do its work properly, should be adjustable to any thickness of lumber and should not interfere with cutting or sawing; also should not be removable.



The Howe Improved Saw Guard

can be applied to either stationary saw, saw with arbor, tilting table or stationary table. Works in conjunction with any splitter and is suitable for any saw bench made. The follower or tail piece protects operator when completing cut. Hoods made of aluminum, arms of steel, stand of cast iron.

Woodworking Guards You Can Depend On

Howe Improved Woodworking Guards are not an experiment. They are now being used in large and small manufacturing plants because they can be depended on to safeguard the hands of workmen.

They are easy to install and do not impede production. Made in accordance with modern requirements.

Men are scarce—Howe Improved Guards protect workmen from their own carelessness and employers from the consequences of neglect to provide guards.

Write at once for our illustrated booklet which describes our complete line of Safety Guards.

"Everything in Safety Appliances"

HOWE SAFETY APPLIANCE CO., GRANITE CITY, ILL.

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UNDERWRITERS' PUBLICATIONS

The National Board of Fire Underwriters publishes pamphlets for the purpose of reducing fire losses. They are called, in most instances, "Rules and Requirements of the National Board of Fire Underwriters," sometimes "Suggestions" or "Specifications."

Blower Systems.

Coal Gas Producers (pressure and suction systems).

Containers for Hazardous Liquids.

Dip Tanks.

Electrical Appliances.

Fire Alarm Systems, Municipal.

Fire Brigades, Private.

Gas Shut-Off Valves.

Gasolene Vapor Gas Lighting Machines, Lamps and Systems.

Gravity Tanks and Pressure Tanks.

Hose Couplings and Hydrant Fittings, for public fire service.

Hose Houses, for mill yards.

Internal Combustion Engines.

Lightning, Protection Against.

National Electric Code.

Nitro-Cellulose Films (storage and handling).

Oil Storage (fuel), storage and use of fuel oil and construction and installation of oil burning equipment.

Oxy-Acetylene Heating and Welding Apparatus.

Railway Car Houses (storage and operating), Construction and Protection of.

Signaling Systems, used for the transmission of Signals affecting the fire hazard.

Skylights.

Sprinkler Equipments, automatic and open systems.

Steam Pump Governors and Auxiliary Pumps.

Underwriters' Laboratories, general information in reference to the nature of its work and the terms and conditions under which tests of fire appliances and materials are conducted.

Vaults.

Walls and Partitions, Protection Against Fire.

The pamphlets relate to manufacture, construction, installation, use, equipment, etc., and have been issued on the recommendation of the National Fire Protection Association.

Any of these publications may be had, without charge, upon application to the National Board of Fire Underwriters, New York City, or by addressing

SAFETY ENGINEERING
80 Maiden Lane New York

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REDUCE YOUR ACCIDENTS—

USE THE SERVICE OF THE

NATIONAL SAFETY COUNCIL

CONTINENTAL & COMMERCIAL BANK BUILDING, CHICAGO

YOU WILL RECEIVE—

(1) Three educational bulletins EVERY WEEK for workmen's bulletin boards—teaching the men to "Be Careful";

(2) One bulletin EVERY WEEK for executives and others in charge of Safety Work—showing HOW to get results;

(3) Unlimited consultation privileges from our Information Bureau to solve your own Safety problems;

(4) One Safe Practices pamphlet every month on such topics as Ladders, Belts, Gearing, etc.;

(5) One News Letter every month;

(6) A copy of the Annual Congress Proceedings—an every day reference book on Safety;

(7) Free use of motion picture films and lantern slides to educate employees;

(8) Special service and miscellaneous information as occasion requires.

The National Safety Council is the National Clearing House for Safety Information. Our 3,600 members are reducing accidents from 20% to 80%. You can do as well.

Use the coupon—It will bring you proof and free samples of bulletins

TO THE NATIONAL SAFETY COUNCIL,
Continental & Commercial Bank Building, Chicago

Please tell me how to reduce accidents 20% to 80%, and send me samples of bulletins.

Name .....

Position with Company .....

Name of Company .....

Company's Business .....

Address .....

Average No. of Employees.....

S. E. 6-18

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National War Savings Day June 28th

That's the day we sign up.

That's the day we tell Uncle Sam just how hard we want to win this war. That's the day our government has officially set for us to purchase War Savings Stamps.

On June 28th every man, woman and child in the United States will be called upon to pledge his or her full quota of War Savings Stamp purchases for 1918.

You will be expected to pledge the **full** amount that you can afford—no more—but by the same token, no less.

In every state, county, city, town and village the War Savings Committees are preparing for this big patriotic rally of June 28th. Unless you have already bought War Savings Stamps to the $1,000 limit, get busy with paper and pencil and figure out the **utmost** you can do.

Remember this. You take no chances when you go the limit on War Savings Stamps. They are the best and safest investment in the world. They pay you 4% interest compounded quarterly. They **can't** go below par. You can get back every dollar you put into War Savings Stamps **any time you need it.** You can turn them in at the Post Office **any time** for their full value plus interest.

Uncle Sam is asking hundreds of thousands of men to **give** their lives to their country. He is asking you only to **lend** your money.

What are **you** lending?

National War Savings Committee, Washington.

W.S.S. WAR SAVINGS STAMPS ISSUED BY THE UNITED STATES GOVERNMENT

Contributed through Division of Advertising — *United States Gov't. Comm. on Public Information*

This space contributed for the Winning of the War by

SAFETY ENGINEERING

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STRANGLING THE PERIODICALS

CONGRESS at its last session passed a hasty postal law increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT THROUGH A POSTAL "ZONE" LAW. *The postal "zone" system was abolished by Abraham Lincoln in 1863 on the recommendation of Postmaster General Blair and has since also been condemned by U. S. Postal Commissions.*

Under the postal zone law some periodicals will be killed—all will be crippled. There will be fewer readers, and the habit of reading curtailed. The great functions of periodicals is to assist in the spread of ideas—by printing the achievements in the world of thought, culture, and science.

Thus to shut out farm journals—as these zone rates will—will lessen the productive power of our country by millions of dollars through loss of better methods. Shut off trade journals and you decrease the manufacturing power by more millions. Shut off the religious papers and there are shut off channels that have raised millions of dollars for distressed humanity. Shut off the great periodicals of the home and there is throttled an avenue that has given expert instruction to hundreds of thousands of mothers and saved their babies to health and citizenship.

These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extent upon periodicals; thus this law increasing periodical postage where it is most needed shuts off opportunity where needed. It penalizes periodical readers.

Congressman Claude Kitchin of North Carolina, who fathered it and compelled its adoption, refusing hearings on the measure—it had been twice defeated by the Senate—stated in his speech in Congress that it was not a War Revenue amendment, but permanent postal legislation.

Canadian magazine readers, even to the Arctic Circle, can receive American magazines at four cents a pound postage. Every American reader—if they live west of Missouri—must pay almost twice as much postage, or from 4½ to 8 cents postage per pound for the same magazines! This is what the postal "zone" law means—discrimination against American citizens of all Western States. Do you live west of Missouri—of Minnesota, Iowa, Arkansas or Louisiana? Then this postal "zone" law discriminates against you and in favor of every Canadian reader to the shores of the Pacific and north to the Arctic Circle!

Will you help—Sign NOW.

It is not a War Tax. It is postal legislation, pure and simple.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT periodical postage increase with its unfair, iniquitous and disastrous "zone" system. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work which they have done and are doing for national education and patriotism.

PETITION TO CONGRESS—Sign Here!

The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT with its postal "zone" system will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education, and upbuilding of our country.

Therefore, I, the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name .....

City or County.....

Street Address.....

State .....

Periodicals mean much more in life. If you will help by a few arguments with your acquaintances and an occasional letter to your Congressman in a spare moment, put a cross mark here.

☛ *Will you help in securing the repeal of this iniquitous law?* ☐

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Room 1417, 200 FIFTH AVENUE, NEW YORK CITY

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